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Changes to EA between September 29, 2017 and December 13, 2017:

- Section 1.8: Issues/Resources Considered/Eliminated; note whitebark pine is not present in parcels (p. 8)
- Section 3.3, New Section added to EA - Oil and Gas Development, including Hydraulic Fracturing (p. 15-19)
- Section 3.8: Water Resources; added discussion on effects of hydraulic fracturing to water resources (p. 38-43)
- Section 3.10: deleted reference to NSO 11-4, sage grouse lek stipulation (p. 50)
- Section 3.11: Cultural Resources: Added discussion of the Lewis and Clark trail (p. 51).
- References: Updated with new references that were cited
- Appendix A:
  - TL 13-28 was added to Parcel 108952-FU for antelope winter range.
  - LN 14-11 (sage-grouse) was added to 108952 EJ, EL, EM, F4, and G4.
- Appendix D - Added Response to Comments.

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

1.1 Introduction & Background

The Bureau of Land Management (BLM) Montana/Dakotas State Office conducts Oil and Gas Federal mineral estate lease auctions for lands managed by the Federal Government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation), United States Forest Service, or other departments and agencies. These auctions also include split estate lands, where the BLM holds subsurface mineral rights, but a party other than the Federal Government owns the surface estate. The Montana/Dakotas State Office has historically conducted four lease sales per year. The BLM's authority to conduct these lease sales is based on various laws including, the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the Montana/Dakotas State Office provides draft parcel lists to the field offices for review. The nominated parcels carried forward for analysis are further reviewed by the field office to determine:

1. if they are in areas open to leasing;
2. if new information has come to light which might change previous analyses conducted during the land use planning process;
3. if there are special resource conditions of which potential bidders should be made aware;
4. and which stipulations should be identified and included as part of a lease.

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing 9 nominated lease parcels encompassing approximately 4,307 Federal mineral acres located in the Butte Field Office (BFO), to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on March 13, 2018. The analysis area includes Park County (See parcel maps in **Appendix C**).

1.2 Purpose and Need

The purpose and need for this action is to respond to Expressions of Interest to lease parcels of land for oil and gas development as mandated by Federal laws, including the Mineral Leasing Act of 1920, Federal Land Policy and Management Act of 1976, and Federal Onshore Oil and Gas Leasing Reform Act of 1987. Based on this review and public comment, the BLM will determine whether to recommend these lease parcels for competitive oil and gas lease sale and, if so, what stipulations or lease notices would apply to these parcels. Offering parcels for competitive oil and gas leasing provides opportunities for private individuals or companies to potentially explore and develop federal oil and gas resources after receipt of necessary approvals, and to sell the oil and gas in public markets.

1.3 Proposed Action

The Proposed Action would be to offer 9 lease parcels of Federal minerals for oil and gas leasing, covering approximately 4,307 Federal mineral acres in Park County (670 acres BLM administered surface, and 3,637 acres private surface). Refer to Chapter 2 for additional information.

1.4 Decision to be Made

The responsible official will determine whether or not to offer oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.5 Conformance with Land Use Plan

This EA is tiered to the information and analysis and conforms to the decisions contained in the 2009 Butte Approved Resource Management Plan (BFO ARMP). The BFO ARMP, and associated FEIS, is the governing land use plan for the Butte Field Office. An electronic copy of the BFO ARMP, ROD, and associated FEIS can be located via the internet on the BLM e-Planning page: https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do.

BLM resource specialists prepared this EA to document the analysis of the lease parcels and recommended appropriate stipulations based upon professional knowledge of the areas involved, review of current databases, file information, and some site visits. The lease parcels to be analyzed for sale are within areas determined to be open to oil and gas leasing in the BFO ARMP. Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for the Butte District in the Butte FEIS (pages 1153-1159). An analysis of potential impacts from oil and gas development was analyzed in chapter 4 of the Butte FEIS, and is incorporated by reference into this EA. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the BFO area, and was used to analyze projected wells for the nominated lease parcels. Further details on oil and gas development activities can be found in the Butte Approve Resource Management Plan FEIS, Appendix M.

A detailed site-specific analysis and mitigation of activities associated with any particular lease development would occur when a leaseholder submits an application for permit to drill (APD). A more complete description of mitigation, BMPs, and conditions of approval related to oil and gas lease activities can be found in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at: http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html.

1.6 Public Involvement

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website, local newspapers, the BFO website, and posted online in the National Environmental Policy Act (NEPA) e-Planning website. Scoping was initiated August 14, 2017.

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the U.S. Fish and Wildlife Service (FWS) to manage wildlife. While the BLM manages habitat on BLM lands, MFWP is responsible for managing all wildlife species populations. The FWS also manages some wildlife populations but only those federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. The BLM mailed letters to FWP and USFWS informing them of scoping and EA comment periods, as well as communicated informally with them to identify wildlife concerns, protective measures, and apply stipulations and lease notices associated with the lease parcels.

The BLM consults with Native Americans under various statutes, regulations, and executive orders, including the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the National Environmental Policy Act, and Executive Order 13175-Consultation and Coordination with Indian Tribal Governments. The BLM sent letters to consulting tribes in Montana seeking comments during the scoping and EA comment periods, informing them of proposed lease sale, and invited them to submit issues and concerns BLM should consider in the environmental analysis. See Section 4.2 for a list of tribes contacted for this project.

The BLM also mailed letters to local, state and federal agencies and private surface owners informing them of the lease sale and seeking comments. The BLM received a four comment letters from a split estate surface owners or their representatives, government agencies, and public interest groups that expressed concerns regarding public access (or lack thereof), impacts

to cultural resources, air quality, wildlife, fisheries, water resources, and other resources. All of these resources are analyzed in Chapter 3.

1.7 Resources Identified for Analysis

Analysis issues include resources that are present in proposed lease parcels and/or resources that could be affected by oil and gas leasing. Consistent with Title 43 Code of Federal Regulations 3131.3, the BLM identified lease stipulations for proposed parcels based upon resource concerns that were identified during previous land use planning processes. The following resources/issues will be analyzed in this EA:

- Air resources, greenhouse gas emission and climate change
- Soil resources
- Water resources (surface water, groundwater, wetlands, floodplains, riparian vegetation)
- Upland vegetation, invasive species, and noxious weeds
- Wildlife and associated habitat, specifically including
    - Species listed under the Endangered Species Act (ESA)
    - Sensitive species including sage-grouse and cutthroat trout
    - Other fish and wildlife such as big game and raptors
- Fisheries
- Cultural resources & Native American religious concerns
- Paleontological resources
- Rights of Way for other land uses
- Socioeconomics

1.8 Issues/Resources Considered but Eliminated from Further Analysis

The BLM identified resources that are not present, or that would not be affected by the proposed action. These issues are listed here and are not considered in detail in this EA:

- Locatable and salable minerals
- Coal
- Geothermal
- Hazardous and solid waste
- Lands with wilderness characteristics,
- Special designations (ERMAs, ACECs)
- Wild horse and burros
- Livestock grazing management
- BLM Sensitive Plant Species (not present)
- Cave and karst resources, Wild and Scenic Rivers; Wilderness Study Areas, Special Recreation Management Areas (SRMAs), visual resources.
- Forest products
- Whitebark pine (not present)

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This EA considers the effects of two alternatives: No Action and the Proposed Action. The Proposed Action is based upon expressions of interest that were submitted to the BLM for the March 2018 oil and gas lease sales.

2.2 Alternatives Considered but Eliminated

Parcel MTM 108952-FY was removed from the lease sale because the BLM did not have concurrence from the Federal Energy Regulatory Commission (FERC) to list the parcel at the time scoping was initiated.

2.3 No Action

For EAs on externally initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would not be offered for sale.

The No Action Alternative would exclude all 9 lease parcels, covering approximately 4,307 Federal mineral acres (670 acres BLM administered surface and 3,637 acres private surface) from the competitive oil and gas lease sale. Surface management would remain the same and any ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

2.4 Proposed Action

The proposed action would be to offer 9 lease parcels of Federal minerals for oil and gas leasing, covering approximately 4,307 Federal mineral acres in Park County (670 acres BLM administered surface, and 3,637 acres private surface) in conformance with existing land use planning decisions. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps of all the parcels are in **Appendix C**.

For the split-estate lease parcels, the BLM provided courtesy notification to private landowners that the Federal oil and gas estate under their surface would be included in this lease sale. In the event of activity on such split estate lease parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

Stipulations shown in Appendix A would be included with identified parcels offered for sale in accordance with the BFO ARMP. Standard operating procedures for oil and gas operations on

federal leases include measures to protect the environment and resources such as groundwater, air, wildlife, historical and prehistorical concerns, and other resources.

Federal oil and gas leases would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10-year period, does not make annual rental payments, or does not comply with the terms and conditions of the lease, the BLM would terminate the lease. The lessee can relinquish the lease. The oil and gas resources could be offered for sale at a future lease sale.

Additional NEPA would be conducted at a site-specific scale prior to approval of an Application for a Permit to Drill (APD), and would include discussion of mitigation measures at the project-specific level to avoid/minimize impacts to resources. Conditions of Approval (COAs) would be attached to permits issued to explore and develop the parcels to address site-specific concerns or new information. Therefore, the proposed action includes stipulations applied to lease parcels but does include site-specific mitigation measures.

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the affected environment (i.e., the physical, biological, and socioeconomic values and resources) and environmental consequences to resources that could be affected by implementation of the proposed action. This analysis is tiered to the BFO FEIS and ARMP, and the analysis of direct, indirect, and cumulative effects of oil and gas development are incorporated by reference into this analysis.

The BFO ARMP determined which areas are available for oil and gas leasing and under what conditions those leases would be offered and sold. All of the lease parcels included in the proposed action are within areas that are open to oil and gas leasing in the BFO ARMP. Analysis of the lease parcels is documented in this EA, and was conducted by BFO resource specialists who relied on professional knowledge of the areas involved, review of current databases, file information, and prior site visits to ensure that appropriate stipulations were recommended for a specific parcel.

Unless otherwise noted in the analysis of a specific resource, the analysis area includes the nine nominated lease parcels encompassing approximately 4,307 Federal mineral acres located in Park County (Appendix A and C). The temporal scale of effects includes the 10-year period of a lease term, unless the lease is held by production, in which case the temporal scale is extended to the life of the producing well. If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years.

3.2 Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the Butte FEIS (Appendix M), and is incorporated by reference into this EA. The RFD contains the number of potential oil and gas wells that could be drilled and produced in the Butte area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. Actual drilling proposals that result from leasing will likely differ in location from those anticipated by the RFD.

Areas within the Butte RFD were designated as having moderate, low, and very low potential for the occurrence and development of oil and gas resources; there were no areas of "high" development potential. High development potential areas occur only within proven producing petroleum provinces or in areas with a significant number of hydrocarbon "Shows." Areas of moderate development potential have a significant thickness of sedimentary section present that includes possible source and reservoir rocks. An area having a low potential for development has a thin sedimentary section present or there is insufficient subsurface data available to analyze the potential. It also lacks source or reservoir rocks or is metamorphosed. An area of very low

development potential has no sedimentary section at the surface or insufficient data for a different classification.

The RFD split its analysis in the Butte Field Office Planning Area into five (5) general geographic areas. The first four areas are where conventional oil and gas exploration was predicted. The fifth area was where coalbed natural gas exploration was predicted. All of the proposed parcels are located in Park County.

Two of the proposed leases are partially located within Area 4 (**Table 1**) and two are near area 4 but outside the boundary (generally east of Livingston, MT). Five leases are located north of Area 4 (four parcels north of Wilsall, MT, and one southwest of Wilsall, MT). Eight of the nine leases are in low development potential areas. One is located in both very low and low potential development areas. Refer to **Figure 1 and Table 1.**

Table 1 Parcel development potential

PARCEL NUMBER	ACRES	AREA	DEVELOPMENT POTENTIAL	OWNER
MTM 108952-EJ	398.46	None	LOW	Private
MTM 108952-EL	320.00	None	LOW	Private
MTM 108952-EM	640.00	None	LOW	Private
MTM 108952-F4	653.60	None (near 4)	LOW/VERY LOW	Private
MTM 108952-FR	239.77	Partially in Area 4	LOW	Private
MTM 108952-FU	40.00	None (near 4)	LOW	BLM
MTM 108952-G4	400.00	None	LOW	Private
MTM 108952-G6	240.00	None	LOW	Private
MTM 108952-FT	1375.21	Partially in Area 4	LOW	BLM 630 ac; Private 745 ac

Area #4 consists of the "Crazy Mountain Oil and Gas Play." This area occupies most of the northern portions of Gallatin and Park Counties in the easternmost portion of the Planning Area as a broad extensive area of potential oil and gas resources. In particular, the area east of Livingston appears to have a moderate potential. In Park County, there are currently 33 wells that have been drilled between 1914 and 2008. Six wells have been drilled in recent years. These six wells were drilled in 2007 and 2008. All had minimal production and were plugged and abandoned in subsequent years. All of the thirty-three wells that have been drilled in Park County are plugged and abandoned, or have temporarily abandoned. A temporarily abandoned well is a well that is physically or mechanically incapable of producing oil and/or gas of sufficient value to exceed direct operating costs but may have value for a future oil/gas completion or as a service completion for enhanced recovery or water disposal, and are in the process of being plugged and abandoned. It is envisioned that four wells may be drilled in this area including one deep well east of Livingston around the interstate and three shallow wells exploring for Cretaceous gas resources. It is envisioned that the deep well and one of the shallow wells would yield discoveries that warranted step-out drilling of two holes for each discovery.

Based on RFD analysis, an estimate was made that as many as four conventional oil and gas wildcat wells (exploratory wells drilled in an area with no existing production) might be drilled

in the Butte Field Office Planning Area 4 in the next 15 to 20 years (**Table 2**). Of these four wells, it is estimated that two would be "dry" holes (no economically producible oil or gas is discovered). Dry holes would be plugged and abandoned with surface reclamation occurring shortly afterward. It is further estimated that two of the wells could have oil or gas discoveries, with two located on Federal minerals, and the others located on private or State lands. Each of the discovery wells would probably prompt additional step-out wells. A "step-out well" is a well drilled adjacent to or near a proven well to establish the limits and continuity of the oil or gas reservoir and/or to assist with production. It was estimated that a total of four step-out wells would be drilled, two for each discovery. It is assumed that of these four wells two would be gas wells and two would be oil wells. Coalbed natural gas is not expected to be drilled for on any of the leases.

Table 2: Drilling activity forecast for Area 4

Wildcat Discoveries	Step-out Wells	Commodity
1 deep	**2**	**Gas**
1 shallow	**2**	**Oil**

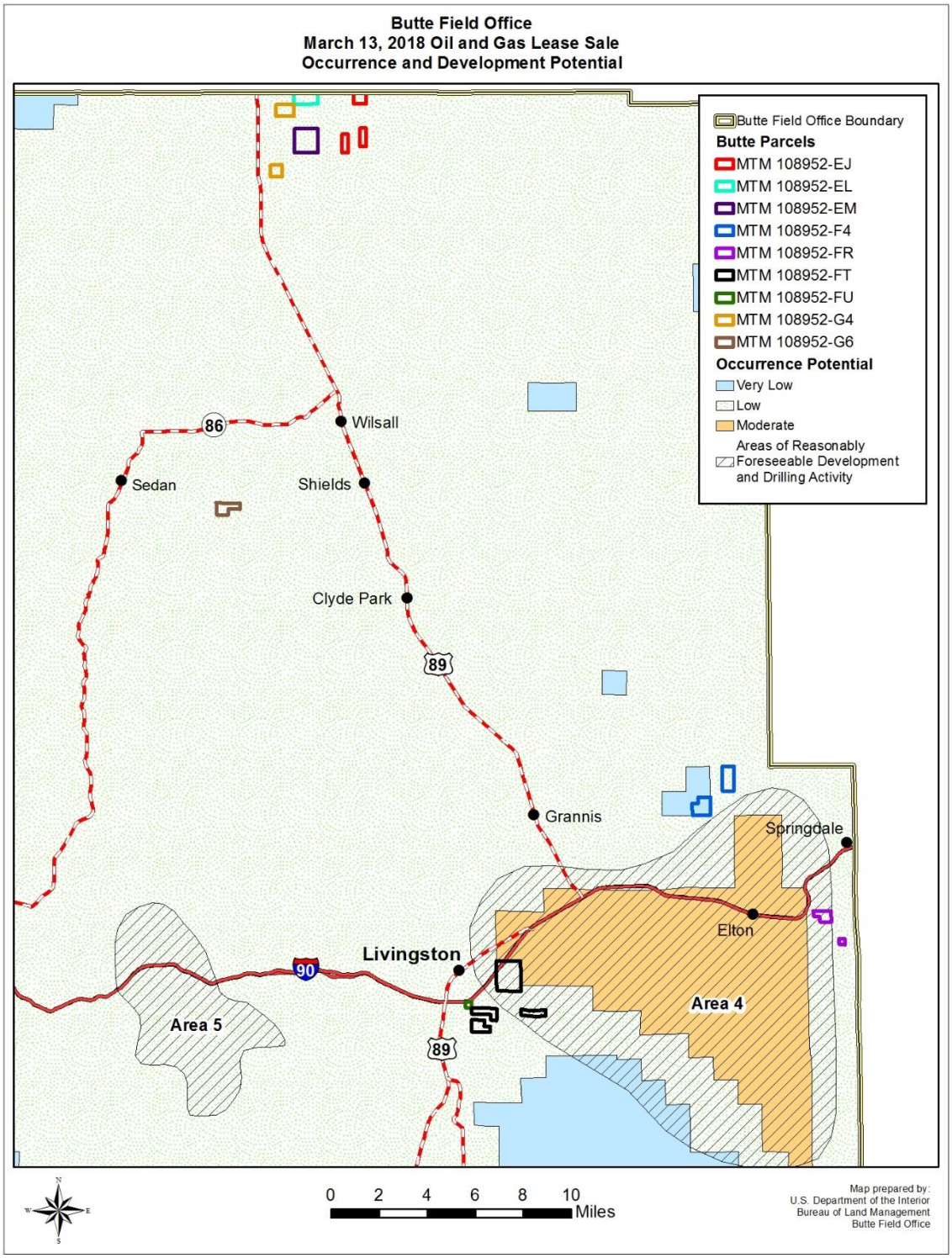
The estimated surface disturbance for conventional oil and gas wells within the Butte Field Office are as follows:

- The maximum area cleared per well pad would be 3.5 acres (about 380 ft. x 400 ft.) and 2.3 acres would be stabilized in about 2 years.
- The maximum area cleared per access road per well would be 17 acres (about 40 ft. x 18480 ft.) and 9 acres would be stabilized in about 2 years.
- All field gathering pipelines for gas (2-4 inch diameter) will follow existing or new access roads and no additional disturbance would result.
- The maximum area cleared for trunk lines to transport gas from four different fields to the existing transmission lines running through the Butte Field Office would be 254.5 acres (about 25 ft. x 443,520 ft.) and the entire area of disturbance would be stabilized in about 2 years. All perennial stream crossings would use horizontal drilling to avoid disturbance to the stream, its bed, and banks.
- Produced oil would be trucked from the well sites.
- Dry and abandoned wells would be reclaimed.

The proposed parcels encompass 4,307 federal mineral acres in Park County, with two of the nine parcels partially located in Area 4. Based on the low development potential of the parcels in question, the effects analysis for this EA is assuming development of one well and one step out well in Area 4 and one wild cat well outside of Area 4. Each of these three wells would be for conventional oil and gas. Based on the disturbance estimates listed in the RMP, the amount of surface disturbance for each well includes:

- 3.5 acres for the well pad and 17 acres for access roads
- 7 acres for trunk lines (total of 254.5 / total # wells (35) = 7 acres)
- Total acres of surface disturbance per well = 27.5 acres
- Total for 3 wells = 82.5 acres of surface disturbance.

Figure 1: Development Potential for the proposed nine lease parcels



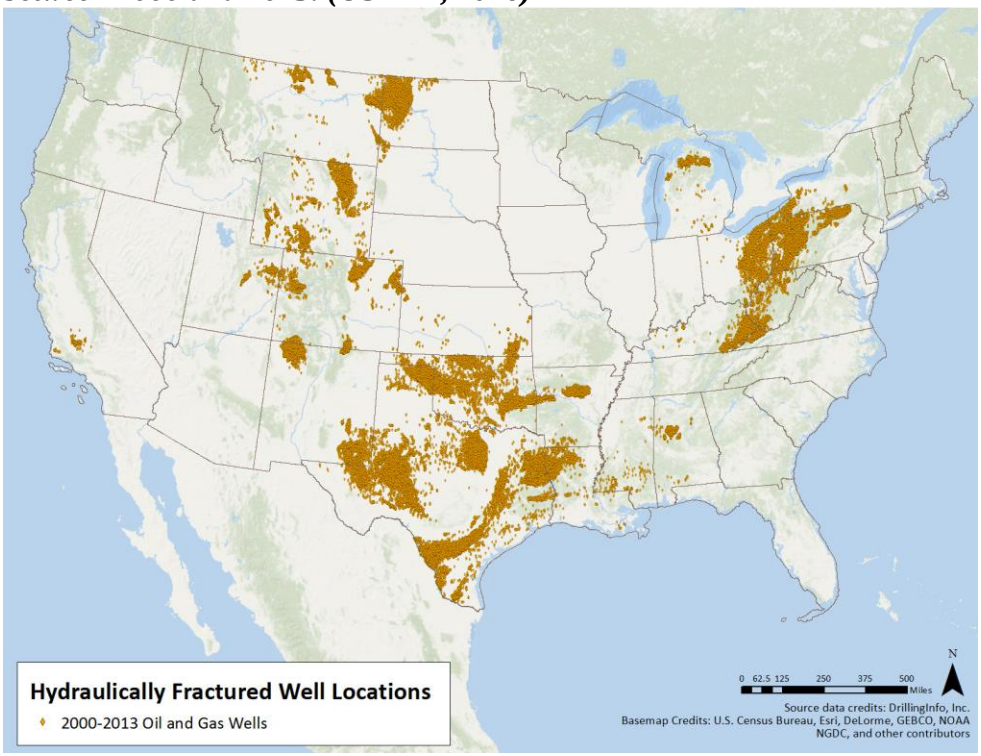
3.3 Oil and Gas Development, including Hydraulic Fracturing

Public comments on the EA indicated a concern that neither this EA nor the ARMP FEIS included discussion on the effects of hydraulic fracturing ("fracking"), and that fracking technology is likely to be used in the future. The following discussion was added to the EA to respond to the public's request to analyze the effects of fracking.

Since the mid-2000s, the combination of modern hydraulic fracturing and directional drilling has become widespread and significantly contributed to a surge in oil and gas production in the United States. Slightly more than 50% of oil production and nearly 70% of gas production in 2015 is estimated to have occurred using hydraulic fracturing. Hydraulic fracturing is widely used in unconventional (low permeability) oil and gas reservoirs that include shales, so-called tight oil and tight gas formations, and coalbeds, but it is also used in conventional reservoirs.

Using data from several commercial and public sources, the EPA estimates that 25,000 to 30,000 new wells were drilled and hydraulically fractured in the United States annually between 2011 and 2014. These hydraulic fracturing wells are geographically concentrated; in 2011 and 2012 almost half of hydraulic fracturing wells were located in Texas, and a little more than a quarter were located in the four states of Colorado, Pennsylvania, North Dakota, and Oklahoma (USEPA 2016, page 3-1). As Figure 2 indicates, there has been very limited use of hydraulic fracturing in the Billings and Butte Planning areas, but is more common across portions of the HiLine and Miles City planning areas in Montana.

Figure 2. Locations of the approximately 275,000 wells drilled and hydraulically fractured between 2000 and 2013. (USEPA, 2016)



The FEIS for the Butte ARMP (Appendix M) identified four general geographic areas where conventional oil and gas exploration is predicted to occur: Area 1 - Southern Deerlodge Valley Basin, Area 2 - the Imbricate Thrust Zone located to the north and east of Helena, Area 3 - the Helena Salient Gas Play Zone over the east-central portion of the Butte Planning Area, and Area 4 - the Crazy Mountain Oil and Gas Play. Appendix M also notes the potential for coal bed natural gas development in limited and scattered areas in Gallatin and Park Counties, most notably the Bozeman Pass / Trail Creek area. The RFD scenario described in the FEIS identified a relatively low amount of oil and gas development for the Butte Planning Area. In the last 15 years, the Butte Field Office has not approved any APDs.

Hydraulic fracturing is a standard treatment for stimulating the productivity of oil and gas wells, which has been utilized by the oil and gas industry since the late 1940s. The process consists of pumping a viscous fluid containing a propping agent into a wellbore at high pressure in order to create and stabilize fractures that extend from the wellbore into the target oil or gas formations.

To create or enlarge fractures, fluid comprised typically of water and additives is pumped into the productive formation at a gradually increasing rate and pressure. Hydraulic fracturing fluid is approximately 98 percent water with the remainder being chemical additives and propping agents (proppant), such as sands. Chemicals used in stimulation fluids include acids, friction reducers, surfactants, potassium chloride (KCl), gelling agents, scale inhibitors, corrosion inhibitors, antibacterial agents, and pH adjusting agents and typically comprise less than 2% of the total fluid. Types of fracturing fluids, conditions for use, and common chemical additives are identified in Tables 3 and 4 below.

Table 3. ***Fracturing Fluids and Conditions for Their Use***

Base Fluid	***Fluid Type***	***Main Composition***	***Use Conditions***
Water Based	Linear Fluids	Gelled Water, GUAR<HPG, HEC, CMHPG	Short Fractures, Low Temperatures
	Crosslinked Fluids	Crosslinker + GUAR, HPG, CMHPG, CMHEC	Long Fractures, High Temperatures
Foam Based	Water-based Foam	Water and Foamer + N2 or CO2	Low Pressure Formations
	Acid-based Foam	Acid and Foamer +N2	Low Pressure, Water Sensitive Formations
	Alcohol-based Foam	Methanol and Foamer +N2	Low Pressure Formations with Water Blocking Problems
Oil Based	Linear Fluids	Oil, Gelled Oil	Water Sensitive Formation, Short Fractures
	Crosslinked Fluids	Phosphate Ester Gels	Water Sensitive Formation, Long Fractures
	Water External Emulsions	Water + Oil + Emulsifier	Good for Fluid Loss Control

Source: EPA 2004.

Table 4: Fracturing Fluid Chemical Additives

Type of Additive	***Function Performed***	***Typical Products***
Biocide	Kills Bacteria	Gluteridehyde Carbonate
Breaker	Reduces Fluid Viscosity	Acid, Oxidizer, Enzyme Breaker
Buffer	Controls the pH	Sodium Bicarbonate, Fumaric Acid
Clay Stabilizer	Prevents Clay Swelling	KCl, NH CL, KCl Substitutes
Diverting Agent	Diverts Flow of Fluid	Ball Sealers, Rock Salt, Flake Boric-Acid
Fluid Loss Additive	Improves Fluid Efficiency	Diesel, Particulates, Fine Sand
Friction Reducer	Reduces the Friction	Anionic Copolymer
Gel Stabilizer	Reduces Thermal Degradation	MEOH, Sodium Thiosulphate
Iron Controller	Keeps Iron In Solution	Acetic & Citric Acid
Surfactant	Lowers Surface Tension	Fluorocarbon, Nonionic

Source: EPA 2004.

When the pressure exceeds the rock strength, the fluids create or enlarge fractures that can extend several hundred feet away from the well. As the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pressure is released. After fracturing is completed, the majority of the injected fracturing fluids returns to the wellbore and is reused or disposed of at an approved disposal facility. Proppant, consisting of synthetic or natural silica sand, may be used in quantities of few hundred tons for a vertical well to a few thousand tons for a horizontal well.

During the chemical mixing stage of the hydraulic fracturing, chemicals are added to water to alter its properties for hydraulic fracturing, some of which are known to be hazardous to human health. The severity of impacts on fresh water resources depends, in part, on the identity and amount of chemicals that enter the environment, which can vary from well to well, and from site-specific characteristics.

A typical fracture stimulation technique involves 20-30 stages which partition the wellbore into segments which are each separately fracture stimulated. This allows for more efficient use of frac fluid and proppant and a more evenly distributed treatment of the full length of the wellbore. Within the larger BLM Montana-Dakotas planning area, hydraulic fracturing, in conjunction with horizontal drilling, has allowed for development of unconventional zones that were once considered uneconomical, like the Bakken and Three Forks Formations in the Williston Basin area.

The majority of the treatments are pumped for these seven reasons:

1. increase the flow rate of oil and/or gas from low permeability reservoirs,
2. increase the flow rate of oil and/or gas from wells that have been damaged,
3. connect the natural fractures and/or cleats in a formation to the wellbore,
4. decrease the pressure drop around the well to minimize sand production,
5. decrease the pressure drop around the well to minimize problems with asphaltine and/or paraffin deposition,
6. increase the area of drainage or the amount of formation in contact with the wellbore, and

7. connect the full vertical extent of a reservoir to a slanted or horizontal well

The typical steps of hydraulic fracturing can be described as follows:

1. Water, sand and additives are pumped at high pressures down the wellbore.
2. The liquid goes through perforated sections of the wellbore and into the surrounding formation, fracturing the rock and injecting sand or other proppants into the cracks to hold them open.
3. Experts continuously monitor and gauge pressures along with the volume of fluids and proppants, while studying how the sand reacts when it hits the bottom of the wellbore; slowly increasing the density of sand to water as the frac progresses.
4. This process may be repeated multiple times, in "stages" to reach maximum areas of the wellbore. When this is done, the wellbore is temporarily plugged between each stage to maintain the highest water pressure possible and get maximum fracturing results in the rock.
5. Frac plugs are drilled or removed from the wellbore and the well is tested for results.
6. The water pressure is reduced and fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the cracks and allow the oil/gas to flow to the well bore.

Fractures created during hydraulic fracturing enable better flow of oil and gas from the reservoir into the production well. Water that naturally occurs in the oil and gas reservoirs also typically flows into and through the production well to the surface as a byproduct of the oil and gas production process. Wells that undergo hydraulic fracturing may be drilled vertically, horizontally, or directionally and the resultant fractures induced by the hydraulic fracturing can be vertical, horizontal, or both.

Oil and gas operations must attempt to uphold water resource integrity through conduct that minimizes adverse effects to surface and subsurface resources, prevents unnecessary surface disturbance, and conforms with currently available technology and practice. Oil and gas operators cannot commence either drilling operations or preliminary construction activities before the BLM's approval of the Application for Permit to Drill (APD). A copy of the approved APD and any Conditions of Approval must be available for review at the drill site and all operators, contractors, and subcontractors must comply with the requirements of the approved APD and/or Surface Use Plan of Operations. Unless it is otherwise provided in an approved Surface Use Plan of Operations, the operator must not conduct operations in riparian areas, floodplains, playas, lakeshores, wetlands, and/or areas subject to severe erosion and mass soil movement.

The amount of water needed to fracture a well depends on the geologic basin, the formation, and depth and type of well (vertical, horizontal, directional), and the proposed completion process. Shales require relatively large volumes of water and proppant (such as the Bakken), whereas hydraulic fracturing can be conducted with smaller volumes of water in tight formations (includes portions of the Williston and Bighorn basins). Hydraulic fracturing technologies can be applied to coalbed methane production in various ways, for example, with much smaller water volumes and no proppant, or with water-based gels or foams and proppant

(USEPA 2016, pages 3-7 through 3-10).

Across the United States, the median volume of water used, per well, for hydraulic fracturing was approximately 1.5 million gallons between January 2011 and February 2013. **Table 5** below identifies median volumes, and the 10th and 90th percentiles for water use per hydraulically fractured well between January 2011 and February 2013 for 15 states including Montana (USEPA 2016a). Montana's median volume per well (1,455,757 gallons) is less than the national median volume. While hydraulic fracturing uses billions of gallons of water every year at the national and state scales, when expressed relative to total water use or consumption, however, hydraulic fracturing generally accounts for only a small percentage, usually less than 1%. (USEPA, 2016, page 4-46).

Table 5. Water use per hydraulically fractured well between January 2011 and February 2013. Medians and percentiles were calculated from data submitted to FracFocus 1.0

State	Number of FracFocus 1.0 Disclosures	Median Volume per Well (gallons)	10th percentile (gallons)	90th percentile (gallons)
Arkansas	1,423	5,259,965	3,234,963	7,121,249
California	711	76,818	21,462	285,306
Colorado	4,898	463,462	147,353	3,092,024
Kansas	121	1,453,788	10,836	2,227,926
Louisiana	966	5,077,863	1,812,099	7,945,630
Montana	**207**	**1,455,757**	**367,326**	**2,997,552**
New Mexico	1,145	175,241	35,638	1,871,666
North Dakota	2,109	2,022,380	969,380	3,313,482
Ohio	146	3,887,499	2,885,568	5,571,027
Oklahoma	1,783	2,591,778	1,260,906	7,402,230
Pennsylvania	2,445	4,184,936	2,313,649	6,615,981
Texas	16,882	1,420,613	58,709	6,115,195
Utah	1,406	302,075	76,286	769,360
West Virginia	273	5,012,238	3,170,210	7,297,080
Wyoming	1,405	322,793	5,727	1,837,602

USEPA, 2016a

The three major sources of water for hydraulic fracturing are surface water (i.e., rivers, streams, lakes, and reservoirs), groundwater, and reused hydraulic fracturing wastewater. Potential water sources available for hydraulic fracturing and drilling operations in Montana vary considerably in space and time, but may include water transported from outside the state or hydrographic basin, irrigation water that is leased or purchased, water purchased from a water provider such as municipalities, treated wastewater, new surface water diversions, produced water, reused or recycled drilling water, or on-location water supply wells. Operators must comply with Montana water law and secure necessary water rights from the Montana Department of Natural Resources and Conservation (MDNRC).

3.4 No Action Alternative - Impacts

Under the No Action Alternative, the proposed parcels would not offered for sale. The No Action Alternative would result in the continuation of the current land and resource uses on the lease parcels, and would remain the same as the affected environment described below by resource as well as in the Butte ARMP, with the exception of economics as noted below.

Under No Action, the BLM would not collect revenues from leasing the parcels, which would include the bonus bids paid at the competitive lease auction and annual rents collected on leased parcels not held by production. Since the BLM would not collect revenue, there would be no money dispersed to the State of Montana and Park County. As noted in the Economic analysis in Section 3.14, the loss in revenue could be up to $6,435 in annual rent for the first five years, $8,580 for the second five years, and a one-time bonus bid revenue of $8,580, assuming one hundred percent of the proposed parcels are sold.

3.5 Direct, Indirect, and Cumulative Effects of the Proposed Action

The act of leasing parcels would not cause direct or cumulative effects to resources because no surface disturbance would occur. The only direct effects of leasing are the creation of valid existing rights and impacts related to revenue generated by the lease sale receipts.

Future lease exploration and development activities proposed through individual APD submission will be subject to future BLM decision-making and NEPA analysis. The BLM assumes there is a high interest in development of any leased parcels but, even if lease parcels are leased, it is uncertain whether development would actually occur. Therefore, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. This analysis assumes wells would be developed based upon information described in the Reasonable Future Development Scenario described in the Butte ARMP FEIS and in Section 3.2 above.

Upon receipt of an APD, the BLM would initiate a site-specific NEPA analysis that considers the direct, indirect, and cumulative effects of a specific action. At this time, detailed information about proposed wells and facilities would be provided for particular leases. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify APD Conditions of Approval (COAs), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

Overall impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the BFO FEIS (BLM, 2009). The lease parcels being analyzed in this EA are designated open to oil and gas leasing with appropriate stipulations.

3.6 Air Resources

Affected Environment

Air resources include air quality, air quality related values (AQRVs), and climate. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources. Air resource impacts are affected by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Air Quality

Ambient air quality in a given location may be characterized by comparing the concentration of various pollutants in the ambient air with the standards set by federal and state agencies. Under the authority of the Clean Air Act (CAA), the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS) for six air pollutants. The standards set maximum allowable atmospheric concentration of these six criteria pollutants. The primary standards were established to protect the public health within an adequate margin of safety; the secondary standards were established to protect the public welfare from any known or anticipated adverse effects of a pollutant. Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM10 and PM2.5), ozone (O3), sulfur dioxide (SO2), and lead.

Two additional pollutants of concern, nitrogen oxides (NOx) and volatile organic compounds (VOCs) are also regulated because they contribute to the formation of ozone in the atmosphere; however, no NAAQS have been established for these pollutants. Additionally, greenhouse gases (GHGs) became regulated pollutants on January 2, 2011 because of their contribution to global climate change effects. Many air quality permitting and regulation activities are delegated to the Montana Department of Environmental Quality (MDEQ), which has also set state ambient air quality standards. MDEQ has also established permitting and registration requirements as well as emission standards for equipment involved in oil and gas development.

The EPA air quality index (AQI) is an index used for reporting daily air quality to the public (https://www.airnow.gov/). The AQI index is one way to generally evaluate how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates a daily AQI based on local air monitoring data. Air monitoring data and daily AQIs are available within the proposed areas for leasing in Yellowstone County. The following terms help interpret the AQI information:

- Good – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- Moderate – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.

- Unhealthy for Sensitive Groups – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- Unhealthy – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- Very Unhealthy – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.
- Hazardous – The AQI is above 300. This level would trigger a health warning of emergency conditions. The entire population is more likely to be affected.

AQI data show air quality is good near and within the analysis area and that there is little risk to the general public from poor air quality (**Table 6**). Based on available data for the most recent 3-year period (2014-2016) for Gallatin, Fergus, and Lewis and Clark, at least 82% percent of the days were rated "good" over the three-year period.

Table 6 : Air Quality Index Data 2014-2016

County	Days in Period	Days Rated Good	% Days Rated Good	Days Rated Moderate	Days Rated not healthy[1]
Gallatin	1096	983	90%	110	3
Fergus	1096	1049	96%	37	10
Lewis and Clark	1096	901	82%	170	25

[1] includes days rated unhealthy for sensitive groups, unhealthy, and very unhealthy
Source: EPA Air Data https://www.epa.gov/outdoor-air-quality-data (EPA 2016)

The area managed by the Butte Field Office where the parcels for this lease sale are proposed, is in compliance with all NAAQS. Maximum concentrations of air pollutants measured within or near the analysis area are summarized in **Table 7**. Data is shown as a percentage of the NAAQS and is based on monitoring data available for 2014 through 2016. Data are not provided for CO and lead, which are typically not pollutants of concern associated with oil and gas leasing. Oil and gas development can result in emissions that affect ambient concentrations of particulate matter, ozone, and nitrogen oxides from construction and production activities and in some fields, concentrations of sulfur dioxide can be affected. Hazardous air pollutants (HAPs) may also be emitted from oil and gas operations, including well drilling, well completion, and venting. However, no ambient standards have been established for HAPs associated with oil and gas development in this area and ambient monitoring data is not available.

Ozone concentrations above the NAAQS have been measured in Utah and Wyoming in areas with considerable oil and gas activity, however, only moderate ozone concentrations have been measured in Montana's oil and gas development areas. Based on 2014-2016 data from monitors located within or near the analysis area, ozone concentrations are approximately 80 percent of

the ozone NAAQS. Measured concentrations of NO_2, PM_{10}, $PM_{2.5}$, and SO_2 are well below the NAAQS in the analysis area.

Table 7 : Air Monitoring Values within the Analysis Area 2014 -2016

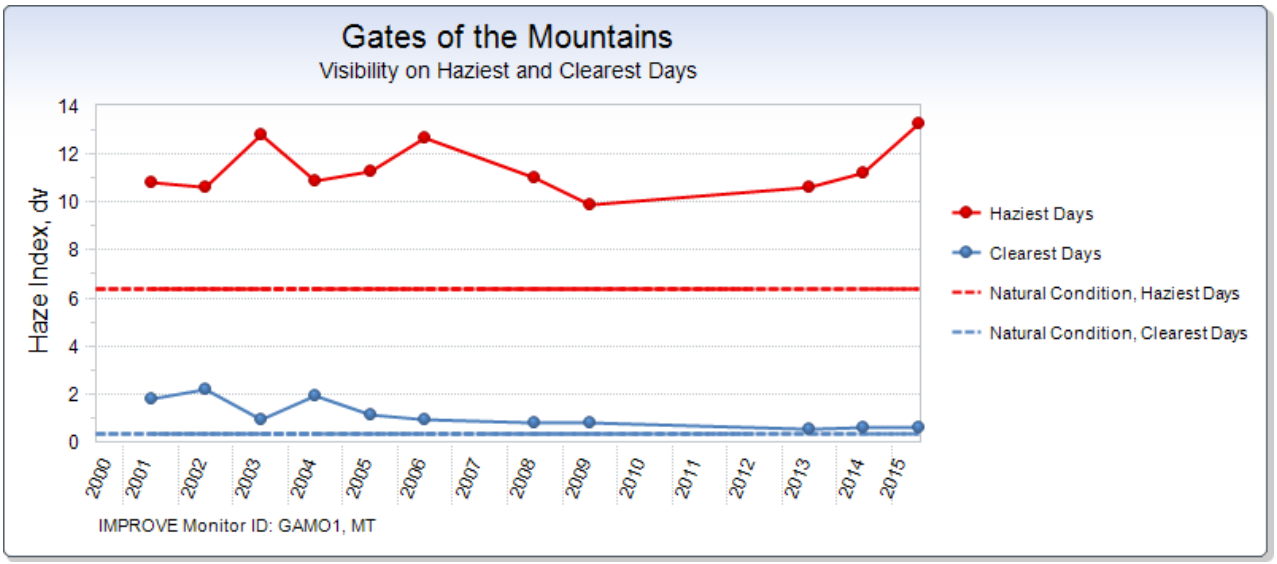
Pollutant	NAAQS	MAAQS	units	Averaging Time / Form	Station	Monitored Concentration	% of NAAQS/ MAAQS
O_3	0.07	N/A	ppm	8-hour 3 yr. ave. of 4th high daily max.	Helena	0.057	81%
					Yellowstone	0.061	87%
					Lewistown	0.056	80%
					Cody WY	--	--
NO_2	100	300	ppb	1-hour 3 yr. ave. of 98th %tile of daily max	Helena	--	--
					Lewistown	11	11%
					Cody WY	--	--
	53	50	ppb	Annual annual mean	Helena	--	--
					Lewistown	3	6%
					Cody WY	--	--
PM_{10}	150	150	ug/m^3	24 hour max. over 3 years	Helena	--	--
					Lewistown	104	69%
					Cody WY	55	37%
	N/A	50	ug/m^3	Annual 3 yr. ave. of annual mean	Helena	--	--
					Lewistown	8.6	17%
					Cody WY	10.3	21%
$PM_{2.5}$	35	N/A	ug/m^3	24 hour 3 yr. ave. of 98th percentile	Helena	23.3	66%
					Lewistown	23.2	66%
					Cody WY	20.6	59%
	12	N/A	ug/m^3	Annual 3 yr. ave. of annual mean	Helena	3.2	27%
					Lewistown	4.6	38%
					Cody WY	4.1	34%
SO_2	75	50	ppb	1-hour 3 yr. ave. of 99th percentile daily max.	Helena	1.8	2%
					Lewistown	--	--
					Cody WY	--	--

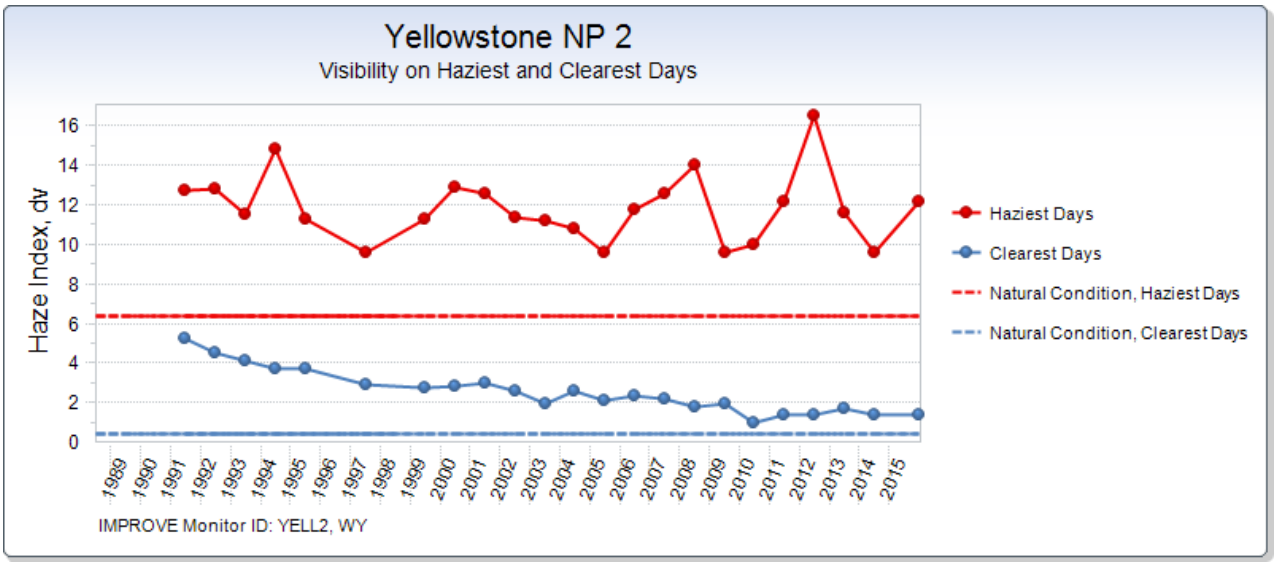
[a] Representative concentrations are based on data from the Birney monitoring station in Rosebud County, Lewistown station in Fergus County, and Cody station in Park County, Wyoming. Source: EPA Air Data https://www.epa.gov/outdoor-air-quality-data (EPA, 2016a)

Air resources also include visibility, which can be assessed in terms of the distance that a person can distinguish a large dark object on the horizon and is measured as the standard visual range in miles. Because visibility at any one location is highly variable throughout the year, it is characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days. Visibility degradation is primarily due to anthropogenic sulfate, nitrate, and particulate emissions and due to wildfires. Air pollutants affecting visibility can be transported hundreds of miles.

Figure 3 illustrates visibility trends based on air monitoring data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. Monitoring data from two Class I areas near some of the proposed parcels is presented for the Gates of the Mountains Wilderness Area near Helena MT and Northern Cheyenne Indian Reservation (IMPROVE, 2017). Visibility data is shown in terms of visibility on the haziest days annually and on the clearest days annually as measured by the haze index. The haze index has a unit of measure called deciview (dv) and a one unit change in deciview may be noticeable under certain conditions. Higher deciview values correspond to hazier conditions. A significant improving trend in visibility is apparent for the clearest days at the Gates of the Mountains Wilderness and Yellowstone National Park, while visibility has remained relatively stable for the haziest days.

Figure 3: Visibility Trends in Nearby Class I Areas



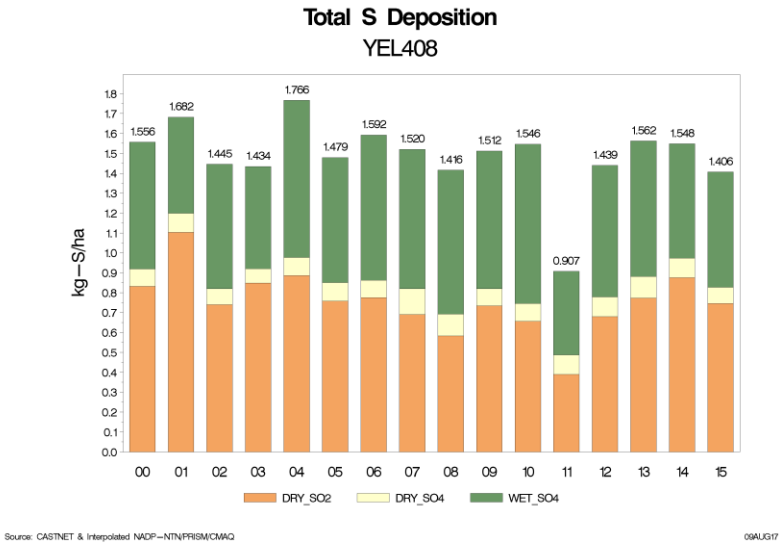


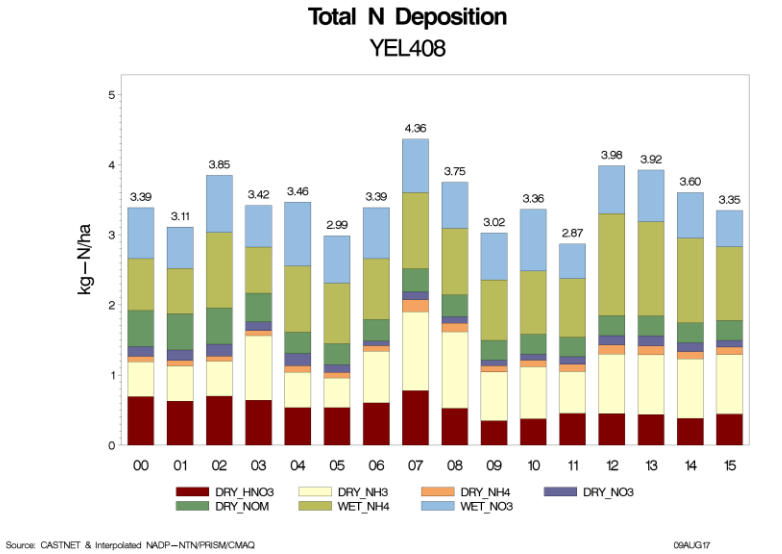
Atmospheric deposition occurs when gaseous and particulate air pollutants are deposited on the ground, water bodies or vegetation. The pollutants may settle as dust or be washed from the atmosphere in rain, fog, or snow. Deposition is the process by which pollutants are removed from the atmosphere via mechanical and chemical processes. When air pollutants such as sulfur and nitrogen are deposited into ecosystems, they may cause acidification, or enrichment of soils and surface waters. Atmospheric nitrogen and sulfur deposition may affect water chemistry, resulting in impacts to aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Although nitrogen is an essential plant nutrient, excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others.

These processes are measured via two distinct methodologies, i.e. wet deposition and dry deposition monitors. The National Atmospheric Deposition Program (NADP) is a cooperative effort among many agencies and universities that uses various precipitation chemistry monitoring networks to measure wet deposition and study its effects on the environment. The Clean Air Status and Trends Network (CASTNET) is a national monitoring network designed to measure dry atmospheric deposition, and to provide data to assess trends in air quality and ecological effects due to changes in air pollutant emissions. CASTNET provides long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and ozone concentrations and deposition fluxes of sulfur and nitrogen pollutants.

There are two deposition monitoring sites located within or near the analysis area for the proposed parcels. The monitoring site at Yellowstone National Park is a CASTNET site and includes both wet and dry deposition. The Clancy monitoring site near Helena is a NADP wet deposition site. Data from the Yellowstone National Park site shows a slight increase in total wet and dry nitrogen deposition over the period from 2000-2015 while total wet and dry sulfur deposition has decreased (Figure 4). Similar trends are evident in wet deposition data from the Clancy site (NADP, 2017). Lake acidification is unlikely with these deposition values and has not been reported at lakes in the area.

Figure 4: Total Nitrogen and Sulfur Wet and Dry Deposition at Glacier national Park (2000-2015)





Climate and Climate Change

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years such as temperature and precipitation. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes

in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC, 2013). Climate change and climate science are discussed in detail in the climate change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR, 2010).

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC, 2013). The global average surface temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC, 2013). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth).

In Montana, annual average temperatures have been steadily increasing between 1901 and 2016 from 41.8°F to 44.6°F statewide. Statewide precipitation has varied only slightly from the mean of 18.62 inches during that timeframe but regional precipitation has become wetter in some areas and drier in others (NOAA, 2017). **Table 8** shows annual changes in temperature and precipitation per decade in several regions in the state.

Table 8: Annual Climate Trends in Montana (1901-2015)

Region	**Annual Mean Temperature Change (°F/decade)**	**Precipitation Change (inches/decade)**
Western MT	+0.2	-0.05
North Central MT	+0.3	-0.04
South Central MT	+0.2	+0.07
Northeastern MT	+0.3	+0.08
Southeastern MT	+0.2	+0.09

Source: *NOAA National Centers for Environmental Information, https://www.ncdc.noaa.gov/cag/*

Earth's atmosphere has a natural greenhouse effect wherein naturally occurring gases such as water vapor, carbon dioxide (CO2), methane (CH_4), and nitrous oxide (N2O) absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR, 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere. The buildup of GHGs such as CO2, CH_4, N2O, and other less common gases since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the

heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric lifetime of 12 years (Climate Change SIR, 2010).

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the climate change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The EPA identifies eastern Montana as part of the Great Plains region. The following summary characterizes potential changes identified by the EPA (USEPA, 2016) that are expected to occur at the regional scale, where the Proposed Action and its alternatives are to occur.

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions would reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP, 2009, as cited by Climate Change SIR, 2010). Climate changes include warming temperatures

throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.

- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff would increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increased insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific to Montana, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases in Montana are predicted to be between 3 to 5°F at the mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation increases in winter and spring in Montana may be up to 25 percent in some areas. Precipitation decreases of up to 20 percent may occur during summer, with potential increases or decreases in the fall.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could also lead to more fishing closures.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C global average temperature increase to be 241 to 515 percent.

While long-range regional changes might occur within this analysis area, it is not possible to predict precisely when they could occur.

Environmental Consequences

The direct, indirect, and cumulative impacts from on air resources from BLM authorized activities are discussed in the Proposed Butte Resource Management Plan and Final Environmental Impact Statement, September 2008 (BLM, 2008) and are incorporated by reference into this EA. The Record of Decision and Approved Butte Resource Management Plan (BLM, 2009) includes specific management actions for the protection of air resources including:

- Management will minimize or prevent air quality degradation throughout the planning Area by applying mitigation measure to projects.

- Air resources will continue to be evaluated on a case-by-case basis as part of project level planning to ensure compliance with local, state, and federal regulatory requirements. Evaluations will consider the significance of the proposed project and the sensitivity of air resources in the affected area. Mitigation measures will be developed as appropriate to ensure compatibility of projects with air resource management.

- Before approval of an application for permit to drill (APD) for oil and gas or a Sundry Notice application that would involve surface disturbance, the appropriate level of NEPA analysis (in most cases an EA) will be completed. This document will analyze effects on all appropriate resources and resource uses including air quality as identified.

In addition, Lease Notice (LN 14-18) would be applied to all parcels included in this proposed lease sale for conservation of air resources. The lease notice states, "The lessee/operator is given notice that prior to project-specific approval, additional air resource analyses may be required in order to comply with the NEPA, FLPMA, and/or other applicable laws and regulations. Analyses may include equipment and operations information, emission inventory development, dispersion modeling or photochemical grid modeling for air quality and/or air quality related value impact analysis, and/or emission control determinations. These analyses may result in the imposition of additional project-specific control measures to protect air resources."

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality would occur if and when the leases are developed for oil and gas activities. The following paragraphs discuss the type of air emissions that could be expected from future oil and gas development as a result of the proposed lease sale including quantified estimates of potential downstream emissions of greenhouse gases (GHG) emissions and the possible relationship to climate change.

It is important to note that at the leasing stage, there is a degree of speculation and uncertainty with regard to the amount of air pollutant emissions (including GHGs) that could occur since specific design details are not yet known. In addition, the probability and level of predicted development in the region of the proposed parcels is low. Only 33 wells have been drilled in Park County between 1914 and 2008 and all have been plugged and abandoned or temporarily abandoned. Of the six wells drilled in recent years, all had minimal production and were plugged and abandoned in subsequent years. Therefore, the BLM may conduct additional analysis for air quality at the APD stage if development is proposed in the future.

The type of petroleum product, depth of geologic play, drilling and completion methodology, equipment and vehicle make, model, engine size, project acreage, and construction plans are among several variables required to generate meaningful emissions estimates. These factors determine the intensity, duration, and characteristics of associated pollutants. Specifically, information needed to reasonably and more accurately quantify emissions associated with well exploration and production activities include:

- The number, type, and duration of equipment needed to construct/reclaim, drill and complete (e.g., scrapers, drill rigs, completions, supply trucks, compressor, and production facilities);

- The technologies which may be employed by a given company for drilling any new wells to reduce emissions (e.g. Selective Catalytic Reduction [SCR] on diesel powered drill rigs, natural gas fired drill rig engines, the use of "green" completion technology, and multi-stage flare stacks);
- Area of disturbance for each type of activity (e.g. roads, pads, pipelines, electrical lines, and compressor station);
- Compression per well (sales and field booster), or average horsepower for each type of compressor, if needed;
- Onsite gas and liquids treatment and storage equipment; and
- The number and type of facilities utilized for production operations.

These sources have the potential to release air pollutant emissions that contribute to ozone formation or contribute to increased global concentration of GHGs. Air pollutants such as VOCs and HAPs may be emitted from venting, flaring, and equipment leaks. Combustion of fuels in vehicles, generators, engines, and compressors may release CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs and GHGs. Due to the low potential for development and based on the low production from recent wells drilled in the area of the proposed parcels, air emissions and subsequent impacts to air quality from this lease sale is expected to be negligible.

On January 2, 2011, the EPA began regulating GHG emissions under the Clean Air Act from mobile and stationary sources of air pollution because of their contribution to global climate change. While the leasing action itself would not generate any direct or indirect GHG emissions, the BLM recognizes that the reasonably foreseeable consequence of leasing may be oil and gas development, and that such development could result in an increase in GHG emissions due to the post production or "downstream" uses of the petroleum products produced from these parcels. For this EA, the BLM used readily available scientific information and reasonable assumptions about product end use to estimate potential downstream emissions attributable to this lease sale. It should be noted at the outset that the BLM does not exercise control over the specific end use of the oil and gas produced from any individual federal lease and has no authority to direct or regulate the end use of the produced products. As a result, the BLM can only provide an estimate of potential GHG emissions by assuming that all produced products would eventually be combusted. The uncertainty about end uses is in addition to the uncertainty with regard to the actual levels of development and production that may occur at any given well.

Table 9 shows an estimate of potential downstream GHG emissions using reasonable projections and assumptions. In this analysis it was assumed that 100% of oil and gas produced from the parcels included in this EA would be attributed to fossil fuel combustion within the United States for residential heating and electricity. Average oil and gas production rates for each county were obtained from the Montana Department of Natural Resources and Conservation (DNRC) – Montana Board of Oil and Gas Conservation (MBOGC).

The total projected increase in downstream GHG emissions is estimated to be 0.007 million metric tons (MMT) per year of carbon dioxide equivalents (CO2eq) if the lease parcels are sold and developed and if the number of wells projected in the RFD produce oil and gas at a production rate similar to other wells in the associated fields. Lastly, the estimated downstream GHG emissions increase is based on 100% of the estimated production being combusted for

residential use. According to the USEPA, this estimated quantity represents approximately 0.00002% of total U.S. GHG emissions reported in 2015 and 0.003% of Montana GHG emissions reported in 2015, and this quantity represents approximately 0.004% of the reported GHG emissions from coal fired power plants in Rosebud county (https://ghgdata.epa.gov/ghgp/main.do). The estimated quantity of GHG emissions from the combustion of fossil fuels that could be produced from the proposed lease sale parcels is approximately equivalent to the GHG emissions from 139 cars or the CO2 emissions from the energy used in 71 homes (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). At this time, the BLM is disclosing the likelihood and potential magnitude of downstream GHG emissions but is not able to disclose potential impacts to climate change from the estimated downstream GHG emissions related to the proposed lease sale. Analysis of impacts at this stage would be speculative and would be not be based "reasonable projections and assumptions".

Table 9: Estimated Downstream GHG Emissions Due to Fossil Fuel Combustion

County	# of wells estimated for March 2018 Leasing EA		Ave oil prod. Rate (BBL/day/ well)	Ave. gas prod. Rate (MCF/day/ well)	CO_2 Combustion emission factor (g/MMBTU)	CH_4 Combustion emission factor (g/MMBTU)	N_2O Combustion emission factor (g/MMBTU)	CO_2 Emissions (metric tons)	CH_4 Emissions (metric tons)	N_2O Emissions (metric tons)	CO_2eq Million Metric Tons/Year (MMTY)
	oil	gas									
Park	2	0	2	0	74,000	10	0.6	626.63	0.08	0.01	0.0006
Park	0	1	0	1	53,060	1	0.1	19.85	0.00	0.00	0.000020
											0.0007

References: http://bogc.dnrc.mt.gov/onlinedata.asp , https://www.eia.gov/oiaf/1605/coefficients.html#tbl3 , https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf

3.7 Soil Resources

Affected Environment

The Butte FO is characterized by rugged mountains and broad valleys, with average annual precipitation ranging from 9 inches in the lowlands to about 40 inches in the mountains. Principal soils in the Butte Field Office have developed from three major geologic units--older Precambrian Belt Series sedimentary rocks, Boulder batholith granite and related rocks, and younger Paleozoic sedimentary rocks and Paleogene volcanic rocks. In addition, mountain glaciations helped shape and carve the mountain topography. Eroded bedrock from the mountains was deposited in the adjacent valleys.

Soils in the Paleogene valley-fill can be highly variable in physical and chemical properties due to the inherent variability of the source rock. Soils support native communities of grasslands, shrubs, and forest land, punctuated by wetlands and riparian communities along streams. Generally, soils in the lease parcels are clayey residuum weathered from sandstone and shale.

The lease area is a compilation of many soil types across a variety of topographies. These include several that are sensitive and that could be adversely impacted by oil and gas-related activities. Vulnerable soils include soils that are rated as having a very severe, severe, or moderate erosion potential, soils that occur on slopes greater than 30% and soils that have been identified as prime and unique farmland.

Because the area of disturbance related to exploration and drilling may be smaller than the lease parcels, in-depth review of proposed activities should be reviewed in subsequent applications for permitting.

The Natural Resource Conservation Service (NRCS) has identified soils that are vulnerable to erosion for both road and trails as well as for off-road areas in Park County, Montana (NRCS 2017). The erosion hazard rating for roads and trails is used because of the potential disturbance for roads and well pads associated with the oil and gas lease sale. Of the proposed 4,307 mineral acres in the proposed lease sale, 486 acres (11%) are rated as having a moderate erosion hazard (road and trails) and 2,032 acres (47%) are rated as having a severe erosion hazard. A moderate erosion hazard indicates that indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures will be needed. A severe erosion hazard indicates that extensive erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures will be needed.

The NRCS also has identified representative slopes for soil map units (NRCS 2017). These slopes have been used to identify steep slopes. About 1,558 acres (36%) within the lease parcels occur on slopes of 30% or greater.

Prime Farmland is a category of land protected from development under the Food Security Act of 1985. Combinations of soil physical and chemical properties that characterize soil important for production of crops, range, and forest land, independent of land use except for urban land, are

grouped into categories considered to be Prime Farmland. Categories include Prime and Unique Farmlands, Farmlands of Statewide Importance, and Locally Important Farmland. Soil properties that define these categories are set respectively at a national, state, and local level. A total of 22 acres (0.5%) of Farmland of Statewide Importance are found within the lease parcels.

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on soil resources. Any potential effects on soils from the sale of lease parcels may occur at the time the leases are developed at the APD stage. The development of the leases would result in reasonably foreseeable disturbances to soils. Potential development could include construction and operation of well pads, access roads, pipelines, power lines, reserve pits, and other facilities and would result in the exposure of mineral soil, soil compaction, loss of soil productivity, and increased susceptibility to wind and water erosion. The likelihood and magnitude of these occurrences is dependent upon local site characteristics, climatic events, and the specific mitigation applied. Potential impacts would be addressed in more detail at the APD stage, which would also be subject to additional NEPA and public review.

Lease stipulations (CSU 12-19 Non-Boulder Batholith and Boulder Batholith Soils) regarding steep slopes and non-Boulder Batholith soils would require an engineering/reclamation plans that demonstrates that: site productivity will be restored, surface runoff will be controlled, off-site areas will be protected from accelerated erosion, and that surface disturbing activities will not be conducted during wet periods. The lease stipulation would help to minimize impacts to the most vulnerable soils within the lease parcels.

The development of a lease parcel undergoes a complete NEPA analysis during the Application for Permit to Drill (APD) stage of development. At the APD stage, the proponent proposes a location and description of the action, which allows the BLM to fully analyze the impacts from the proposed action to a specific location. Based upon the RFD there may be as many as 3 wells total across all three lease parcels. This would impact up to 83 acres. Impacts to soils would be dependent on location and proposed actions. Specific impacts that the disturbed acres would be analyzed during the APD NEPA analysis. However, a number of measures would be taken to prevent, minimize, or mitigate impacts to soil resources. The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation. Once this topsoil is applied and vegetation is re-established the impacts would be remediated.

Reserve pits would be recontoured and reseeded as described in attached conditions of approval. Upon abandonment of wells and/or when access roads are no longer in service, the authorized officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in attached conditions of approval.

Road constructions requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage.

3.8 Water Resources

Affected Environment

Water in the lease area is managed by the state of Montana. The rights to use surface and groundwater are administered by the Department of Natural Resources and Conservation (DNRC). The water quality standards of Montana support other Federal laws such as the Clean Water Act of 1977, the Water Resources Planning Act of 1962, the Pollution Prevention Act of 1990, and the Safe Drinking Water Act of 1977 and are administered by the Montana Department of Environmental Quality (MDEQ).

Surface and Ground Water

Watersheds are defined by a hydrologic unit code (HUC) and consists of a two-digit sequence for each specific level within the delineation hierarchy. The lease parcels are located in the larger Upper Yellowstone (HUC 1007) and Missouri-Marias (HUC 1003) subregions which contain unique and complex hydrologic systems of stream, prairie wetland, and lake features that vary in hydrologic permanence. Water resources in the area are essential to the residents for agriculture, public water supplies, industry, and recreation. Additionally, water resources and the corresponding riparian-wetland areas are crucial to the survival of fish and wildlife, including many BLM-sensitive fish, reptiles, birds, and amphibians.

According to the National Hydrography Dataset (USGS, 2017,NHD V.210) the parcels contain approximately 2.68 miles of perennial stream and 8.37 miles of intermittent stream **(Table 10).**

Although available since 1987, the Federal Emergency Management Agency (FEMA) flood maps have not been prepared to determine the acreage defined within the 100-year floodplain demarcation. Therefore, the extent (in acres) of defined 100-year floodplains occurring on BLM lands within the parcels is unknown. However, the Montana Natural Heritage Program Wetland mapping (MNHP 2016) identifies wetlands, and many of these include floodplain areas. According the NHP mapping, the parcels contain approximately 31.13 acres of waterbodies and wetlands **(Table 10).**

Streamflow in the area varies seasonally, with the largest flows commonly occurring in the spring or early summer. Water quality is often indirectly tied to streamflow as it is largely dependent on the relative contributions of runoff and groundwater. There are no 303(d) listed streams within the proposed parcels. Approximately 0.74 miles of Potter Creek (MT43A002_010), a 305(b) stream, occur on parcel MTM 108952-G4. Section 305(b) reports provide information on the water quality status of all waters in the State, whereas section 303(d) lists are a subset of these waters – those that are impaired by a pollutant and in need of a TMDL. Potter Creek does not fully support aquatic life because of low flow alterations, sedimentation-siltation and solids (suspended bedload). The probable source of these impairments is from hydrostructure flow regulation-modification. The TMDL for sedimentation-siltation and suspended bedloads have been completed.

Table 10: Mapped hydrologic features located in the lease parcels.

Parcel	Watershed (HUC 8)	Perennial Stream (mi)	Intermittent or Ephermeral Stream (mi)	Riparian / Wetlands (acres)
MTM 108952-EJ	Shields	0.22	0.0	10.5
MTM 108952-EL	Shields/ Upper Missouri	0.12	0.19	19
MTM 108952-EM	Shields	0.05	1.46	11.8
MTM 108952-F4	Upper Yellowstone/ Shields	0.86	1.15	15.9
MTM 108952-FR	Upper Yellowstone	0.0	1.27	0.0
MTM 108952-FT	Upper Yellowstone	0.0	4.12	0.0
MTM 108952-FU	Upper Yellowstone	0	0.16	0.2
MTM 108952-G4	Shields	1.43	0	36.3
MTM 108952-G6	Shields	0.0	0.02	0.0
Total		2.68	8.37	93.7

The BLM has developed and applied stipulations to protect the unique biological and hydrological features associated with 100-year floodplains of major rivers, waterbodies and streams. Stipulation NSO 11-2 states: *No surface occupancy or use is allowed within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.* This stipulation applies to all of the parcels:

Groundwater availability is determined in a large part by the unconsolidated deposits and different rock types that compose the diverse geology of the area. The quality of water in aquifers underlying the region is highly variable, and influences the types of beneficial uses that are possible from the various water sources. Groundwater associated with the lease parcels is defined by the Yellowstone and Shields Rivers alluvial aquifers, and the bedrock aquifers of the Fort Union Formation and Colorado Group. Water in sufficient quality and quantity to support domestic and stock uses is typically found at depths less than 200 feet. Due to the variety of deposits and bedrock, drawdown and recharge rates are also highly variable. Generally, wells that are less than 225 feet deep have water that is less than 50 years old and water greater than 50 years old is found in deeper wells. Throughout the area groundwater quality is good, with nitrate levels below drinking water standards (MBMG, 2016) and no discernable impacts from oil and gas drilling were found in a recent study conducted by the Montana Bureau of Mines and Geology (Blythe, 2017).

Source water protection areas are delineated by the State of Montana for a public water system or include numerous public water systems, whether the source is groundwater or surface water or both, as part of the State Source Water Assessment Program (BLM, 2015b). There are no source water protection sites that occur within the nine parcels. However, there are two source water protection regions (a region is synonymous with an area) that overlap with parcel MTM 108952-FU and MTM 108952-FT. These regions are MT0003557 and MT0001607 and account for approximately 90 acres.

According to the Montana Ground Water Information Center database (2015), there are nine wells that occur in or are within 1000 feet of the parcels. These include parcels MTM 108952-FR, MTM 108952-F4, MTM 108952-EL, MTM 108952-EJ, MTM 108952-FU, and MTM 108952-FT.

Any beneficial use of produced water requires water rights to be issued by Montana Department of Natural Resources and Conservation (MDNRC), as established by law. This water has been used for watering stock, irrigation, drilling operations, and industrial applications.

Wetlands and Riparian Vegetation

There are approximately 94 acres of riparian /wetland resources on six parcels (MT Natural Heritage Program data, 2017). See Table 10. Riparian-wetland areas are among the most productive and important ecosystems, comprising less than 2 percent of the acreage reviewed in this EA. Characteristically, riparian-wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Some of the more common vegetative species that occur in riparian-wetland areas in the project area include bluejoint, redtop, sedges (*Carex spp.*), rushes (*Juncus spp.*), and several different species of willows, alder, chokecherry, and narrow leaf cottonwood. Healthy riparian systems filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to ground water recharge and base flow. Precipitation-dependent wetland sites fluctuate annually, in a range from dry to wet, in direct response to seasonal moisture, temperature, and wind.

The BLM has developed and applied stipulations to conserve riparian values during oil and gas development. Stipulation NSO 11-2 applies to all of the parcels and provides that *no surface occupancy or use is allowed within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.*

Environmental Consequences

Surface and Ground Water

Offering nine parcels for lease would have no direct impacts on water resources including streams, wetlands, floodplains, or waterbodies because no surface disturbance would occur. Any potential effects on water resources from the sale of lease parcels may occur at the time the leases are developed at the APD stage. Fluid mineral development could affect water resources during exploration, drilling, production, and/or abandonment. Potential effects to water resources are both short-term and long-term. The magnitude of these impacts would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success.

Though the proposed action has no direct impact; stipulations regarding steep slopes, erosive soils, and activities on floodplains and in wetlands would minimize potential future impacts and are applied to the initial lease of the parcels (Appendix A). Stipulation CSU 12-18 requires approved engineering and reclamation plans for areas of active mass wasting, unstable land

areas, or steep slopes. Stipulation NSO 11-2 prohibits surface occupancy and use within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams. Standard 16-3 likewise minimizes effects by providing notices that lands may include special areas where surface use may be controlled to prevent damage to surface and/or other resources. Standard 16-3 likewise minimizes effects by initiating erosion control and limited surface use stipulations to protect resources. These requirements would help minimize the potential for future impacts to the corresponding water resources that may be associated with any future exploration and/or development. However, indirect impacts from alterations in watershed hydrology outside of the exclusion zones could indirectly affect the water resources in these systems.

Any potential effects to water resources would occur from subsequent exploration/development of the lease parcels. The Reasonable Foreseeable Development (RFD) was analyzed in the Appendix M of the Butte ARMP FEIS and is summarized in Chapter 3.2 of this EA. As noted in Chapter 3.2, the RFD for this lease sale is three wells for conventional oil or gas. Based on the disturbance estimates listed in the ARMP, the amount of surface disturbance is about 27.5 acres per well, for a total of 82.5 acres of surface disturbance.

Future oil and gas exploration and development of a lease parcel could impact surface water resources by causing the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed. The potential effects from this is accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads), which increases the energy and amount of overland flow by decreasing infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion (MDEQ 2007). These effects would be analyzed at the time of a receipt of an Application for a Permit to Drill and are typically localized with the potential to be reduced through vegetation reestablishment and BMP application. As acres of surface disturbance increase within a watershed, however, so could the effects on water resources.

Future oil and gas exploration and development of a lease parcel could result in spills or produced fluids could potentially impact surface and groundwater resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. These potential effects would be analyzed at the time of a receipt of an Application for a Permit to Drill. In the event of exploration or development, site-specific mitigation measures would be identified to avoid or minimize potential impacts to water resources prior to land disturbance.

To ensure that drilling and completion operations are conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance associated with Federal and Indian oil and gas mineral development. Operators must submit APDs to the agency in accordance to Onshore Oil and Gas Order No.1. Prior to approving an APD, the BLM identifies all potential subsurface formations that will be

penetrated by the wellbore. This includes groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures. All well casing and cementing operations that occur on Federal/Indian lands would be reviewed and approved by BLM and conducted in accordance with the applicable requirements specified in Onshore Oil and Gas Order No. 2 and the American Petroleum Institute (API) standards.

Water Quantity: Oil and Gas drilling operations could impact available quantities of surface water and groundwater. The potential for impacts depends on the combination of water withdrawals and water availability at a given withdrawal location. Where water withdrawals are relatively low compared to water availability, adverse impacts are unlikely to occur. Where water withdrawals are relatively high compared to water availability, impacts are more likely. Areas reliant on declining groundwater are particularly vulnerable to more frequent and severe impacts from cumulative water withdrawals, including withdrawals for hydraulic fracturing. Among surface water sources, smaller streams are more vulnerable to frequent and severe impacts from withdrawals. Seasonal or long-term drought can also make impacts more frequent and severe for surface water and groundwater sources.

Water withdrawals could lead to reduced aquifer water levels, reduced streamflow (through direct withdrawals or drawdown of aquifers that are hydraulically connected to nearby streams or springs), and impacts to water quality parameters associated with stream flow. Typically, produced water from conventional oil and gas wells would originate from a depth below useable aquifers or coal seams.

Compliance with state regulations would help mitigate the impacts of water withdrawals on surface and groundwater by ensuring that water rights are established for all beneficial uses of water, ensuring that water resources are not over-appropriated, and considering the impacts of water withdrawals to groundwater wells and hydraulically connected surface waters.

Water Quality: Potential impacts on groundwater resources from fluid mineral extraction activities could include the following scenarios:

- Contamination of aquifers during drilling through the introduction of drilling fluids.
- Extended fracture growth allowing fracking fluid migration into fresh water resources;
- Cross-contamination of aquifers from the introduction of drilling fluids into one aquifer that travels upward into shallower units due to improperly sealed well casings.
- Localized depletion of unconfined groundwater availability.
- Progressive contamination of deep confined, shallow confined, and unconfined aquifers if the deep confined aquifers are not completely cased off from deeper units.
- Contamination of shallow aquifers by improperly managed or closed reserve pits.

Groundwater quality is most susceptible to pollution where the aquifer is shallow, highly permeable, or connected directly to a surface water system, such as river gravels.

The locations of fresh water resources relative to hydraulically fractured oil and gas production wells influence the potential for activities in the hydraulic fracturing water cycle to impact fresh water resources. With increased proximity, activities in the hydraulic fracturing water cycle have

more potential to affect aboveground and below ground drinking water resources. Impacts associated with flow depletion could include increased water temperature, decreased concentration of dissolved oxygen, and increases in the concentration of dissolved solids, which could elevate corresponding parameters such as salinity and the sodium adsorption ratio.
As previously noted, approximately 47 acres in parcels MTM 108952-FU and MTM 108952-FT overlap designated source water protection areas. While the Butte ARMP does not have a stipulation for source water protection areas, these two parcels are covered by NSOs for other resources. Parcel FU has NSO stipulations for floodplains, streams, riparian areas, blue ribbon trout streams, Yellowstone cutthroat trout, National Historic Trails and NRHP. Parcel FT has additional stipulations (refer to Appendix A and B). The minimum size stipulations are applied to is a 40-acre aliquot part. Parcel FU is a 40 acre parcel; therefore the NSOs would cover the entire parcel. The NSOs would also cover most of parcel FT, including the portion in the source water protection area.

Standard 16-3 requires the Agency to furnish data on any special areas, which may include domestic water supplies within 1000 feet of parcels, and stipulates that surface use or occupancy will be controlled to prevent damage to surface or other resources. This level of review and need for additional mitigation would occur at the APD stage for wells located within 1000 feet of the proposed parcels. As noted above, there are currently nine known wells within 1000 feet of the proposed parcels.

Hydraulic fracturing can occur at or near the bottom of a production well or it may take place at different intermediate depths depending on the location of economically producible oil and gas, and thus the total vertical depth of a production well does not necessarily correlate to the depth at which hydraulic fracturing occurs. The distance from the base of the fresh water resource to the shallowest hydraulic fracturing initiation point in a production well serves as a separation distance and can be an important consideration when evaluating potential impacts to fresh water resources from fluid mineral extraction (USEPA 2016).

Underground, hydraulic fracturing can occur in close vertical proximity to fresh water resources. In some parts of the United States (e.g., the Powder River Basin in Montana and Wyoming), there is no vertical distance between the top of the hydraulically fractured oil- or gas-bearing rock formation and the bottom of treatable water, as determined by data from state oil and gas agencies and state geological survey. (USEPA, 2016; page ES-8). When hydraulically fractured oil and gas production wells are located near or within fresh water resources, there is a greater potential for activities in the hydraulic fracturing water cycle to impact those resources. Hydraulic fracturing within fresh water resources introduces hydraulic fracturing fluid into formations that may currently serve, or in the future could serve, as a beneficial public or private use. This could be of concern in the short-term if people are currently using these formations for a beneficial use, such as a drinking water supply. It could also be of concern in the long-term, because drought or other conditions may necessitate the future use of the water within these formations (USEPA 2016, page ES-32).

In naturally fractured or cleated formations, such as gas shales or coal seams, it is possible that multiple fractures can be created and propagated during a hydraulic fracture treatment. Hydraulic fracturing can open up pathways for fluids or gases from geologic layers to flow where they are not intended, which presents an opportunity for groundwater contamination. Surface water

resources could experience negative effects if fracturing fluid chemicals and wastewater leak or spill from the well bore, flowlines, trucks, tanks, or pits.

Chemical mixing and produced water handling activities can impact water resources through spills of chemicals used to make hydraulic fracturing fluid, hydraulic fracturing fluid itself, or produced water reaching surface water or groundwater. There is limited data available regarding spills. An analysis of North Dakota produced water spills found there were approximately 5 to 7 spills of produced water per 100 active wells between 2010 and 2015 (USEPA, 2016; page 10-9). However, not all spills may reach or impact a drinking water resource. The size of the spill and site characteristics will influence whether a spill reaches a drinking water resource. Sandier soils and more permeable rock can increase the potential for spills to reach groundwater. Spill prevention and response factors would be incorporated as Conditions of Approval at the APD stage, and may reduce the frequency and severity of impacts to drinking water resources from spills.

Potential effects to deeper aquifers may include cross-aquifer mixing through the wellbore. All wells would be cased and cemented to depths below accessible freshwater zones pursuant to MBOGC rules and federal regulations. All wells also would be constructed according to relevant MBOGC and MDEQ regulations to prevent cross-aquifer contamination. There would be minor potential for commingling of waters during well construction if proper well drilling procedures and completion techniques are employed.

Produced water from conventional oil and gas, uranium recovery, and CBNG development could impact the quality of surface water and groundwater through impoundments, injection, and discharge. Impounding or discharging produced water could increase evaporative losses of groundwater. Left untreated, produced water discharge and infiltration or leaking produced water disposal pits could reach stream channels via subsurface flow, which could decrease water quality. Proper siting and design of disposal pits would mitigate these impacts. Underground injection control regulations would isolate injection zones from potentially useable aquifers, which would limit the impacts.

The use of any specific water source on a federally administered well requires review and analysis of the proposal through the NEPA process, which will be completed at the APD stage. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007), would be followed, and site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored in order to minimize effects to water resources. All proposed actions must comply with local, state, and federal regulations, including Montana water laws. Additional information on water rights and the availability of water resources in the project area can be obtained at the local MDNRC Water Resources Office.

In addition to federal regulations, the State of Montana's Board of Oil and Gas Conservation (MBOGC) have regulations, which ensure that all resources including groundwater are protected. The MBOGC regulations require new and existing wells, which will be stimulated by hydraulic fracturing, to demonstrate suitable and safe mechanical configuration for the stimulation treatment proposed. If the operator proposes hydraulic fracturing through production casing or through intermediate casing, the casing must be tested to the maximum anticipated

treating pressure. All surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface in accordance with Onshore Oil and Gas Order No. 2, MBOGC rules and regulations, and American Petroleum Institute (API) standards. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. In accordance with MBOGC Rule 36.22.1015, operators are required to disclose and report the amount and type of fluids used in well stimulation to the Board or, if approved by the Board, to the Interstate Oil and Gas Compact Commission/Groundwater Protection Council hydraulic fracturing web site (FracFocus.org).

Wetlands and Riparian Vegetation

Offering nine parcels for lease would have no direct impacts on wetlands and riparian vegetation because no surface disturbance would occur. Any potential effects on wetlands and riparian vegetation from the sale of lease parcels may occur at the time the leases are developed at the APD stage. These effects would be analyzed at the time of a receipt of an Application for a Permit to Drill.

At the leasing stage, the location and extent of development is unknown, and effects were analyzed based on the Reasonable Foreseeable Development Scenario (See section 3.2). The RFD predicts three wells and total disturbance of about 82.5 acres. However, impacts to riparian and wetland vegetation would be limited due to the no surface occupancy (NSO 11-2) stipulations in addition to the riparian buffers on lease parcels containing riparian areas. However, any overland water flows resulting from well development on uplands containing weeds could provide a source for weed establishment within riparian areas that would compete against desirable native vegetation and may reduce the amount of habitat occupied by riparian vegetation.

Given that not all riparian resources are mapped or known by BLM specialists, if riparian areas are discovered during the APD process or development stages, conditions would be applied to conserve riparian resources and riparian functionality. In the event of exploration or development, site-specific mitigation measures would be identified to avoid or minimize potential impacts to riparian-wetland areas prior to land disturbance. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction & runoff, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian/wetland resource conditions.

3.9 Vegetation Resources

Affected Environment

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, and management boundary fence lines. Human activities have affected vegetation communities for over a century. Some of these activities include

infrastructure developments (roads, power lines, pipelines, etc.), chemical applications, logging, livestock grazing, farming, and wildfire rehabilitation, prevention, manipulation, and suppression.

Sagebrush Grassland

Sagebrush grasslands (Mueggler and Stewart 1980) are common in Gallatin and Park counties. Dominant sagebrush subspecies that may occur within this habitat type include Wyoming big sagebrush, mountain big sagebrush, and basin big sagebrush. Dominant grass species include bluebunch wheatgrass, Idaho fescue, needle-and-thread grass, green needle grass, Sandberg's bluegrass, and prairie junegrass. Varieties of forbs are common in sagebrush habitat types and may include western yarrow, rose pussytoes, and Hood's phlox. The majority of the parcels fall into this habitat type.

Idaho Fescue-Bluebunch Wheatgrass Grassland

The Idaho fescue-bluebunch wheatgrass grassland habitat type (Mueggler and Stewart 1980) represents a much smaller portion of grassland habitat types in the analyzed area. Dominant species in addition to Idaho fescue and bluebunch wheatgrass include prairie junegrass, Sandberg's bluegrass, western yarrow, rose pussytoes, and Hood's phlox. Shrubs occur at a very low percentage and may include green rabbitbrush and big sagebrush. This habitat is found in less than 10% of the parcel acreage.

Douglas Fir-mixed Grassland

The Douglas Fir-mixed grassland community generally occurs on moderate-to-steep cooler upland north slopes. Grassland types may include rough fescue, bluebunch wheatgrass, western wheatgrass, and prairie junegrass, with forbs comprising about 41 percent of cover and 50 percent of herbaceous production. Parcel MTM 108952-FR is the only parcel where this habitat type is found.

Invasive, Non-Native Species, Noxious Weeds

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. Several invasive, non-native plant species occupy the project area including: cheatgrass, spotted knapweed, diffuse knapweed, Russian knapweed, houndstongue, Canada thistle, musk thistle, black henbane, whitetop, leafy spurge, and hoary alyssum. All of these species are aggressive invasive species that out-compete desirable vegetation for water and soil nutrients. These species may also reduce cattle grazing performance, wildlife habitat quality, and native species diversity. Cheatgrass is an invasive species well-known for completely replacing native vegetation and changing fire regimes. Noxious weed control is the responsibility of the surface management agency or surface owner in cooperation with the local weed control board. Chemical and biological control methods are utilized, with chemical control being the more predominant. As the parcels located on private lands have not been evaluated for weeds, a site specific evaluation would be made if a site specific proposal were submitted.

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on vegetation because no surface disturbance would occur. Any potential effects on vegetation from the sale of lease parcels may occur at the time the leases are developed at the APD stage. Potential direct and indirect impacts to native vegetation at the APD stage would depend on the native vegetation type, the topography of the lease parcels, soils, and the amount of precipitation. The lease parcels contain mostly grassland habitat with lesser shrubland, riparian and woodland vegetation communities. In areas of habitat disturbance with limited precipitation, it typically takes more time to reestablish desirable native vegetation. The impacts associated with 3 potential well pads totaling up to 82.5 acres including roads, however, would be very site-specific and are not expected to significantly affect these habitats at the community scale. The footprint of the disturbance is also expected to be a small proportion of the habitat area.

While there are currently no known threatened or endangered plant species in the parcels, CSU 12-12 was applied to all parcels and states:

> *The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or requirements of the Endangered Species Act as amended, 16 U.S.C. § et seq., including completion of any required procedure for conference or consultation.*

Because sensitive species lists are updated periodically, field inspections would be required prior to any surface occupancy on lease parcels. A list of sensitive species would be provided to the lessee at the time of lease, and a report would be submitted to the BLM which documents the presence or absence of special status plant species in the area proposed for surface occupancy (Butte RMP, pg 219).

Establishment of noxious weeds and invasive species is likely to occur given the relative frequency of noxious weeds and invasive species within the project area. Weed seeds may be transported on equipment during well development and the soil surface disturbance provides gaps where noxious weeds and invasive species may become easily established or where they may easily expand if already present.

Topography can play a role in the amount of surface disturbance that results from well and road construction. Flat areas would require little or no cut and fill, and road routes would not be constrained by topography. In hilly areas, cut and fill may be required which disturbs additional land. Roads routes could be longer to meet engineering requirements and may also require cut

and fill, which would cause further disturbance and potential removal of surface vegetation. Areas lacking roads near potential drilling sites would have more disturbances, because the entire access route would need to be constructed rather than just a short spur route from an existing road. Roadways are often very prone to weed establishment transported by vehicle tires and undercarriages. Greater amounts of surface disturbance increases the impacts expected on vegetation. CSU 12-18 limits occupancy on slopes over 30% to avoid adverse impacts from extensive cut and fill activities.

Potential impacts to plants include direct mortality from earth excavation or crushing by vehicles. Adverse impacts could also result from soil erosion resulting in loss of the supporting substrate for plants or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful because both current and future generations would be adversely affected. Weeds which are introduced and/or promoted by soil-disturbing activities compete against and displace native vegetation.

Soil-disturbing activities directly affect species by destroying habitat, churning soils, impacting biological crusts, disrupting seedbanks, burying individual plants, and generating sites for undesirable weedy species. Weeds may be introduced during construction and operation of the lease. Dust generated by construction activities and travel along dirt roads can affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil or other chemical spills could contaminate soils so as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term impacts could be expected on vegetation resources.

Mitigation would also be addressed at the site-specific APD stage of development. Needed mitigation and conditions of approval would be identified and addressed during planning at the APD stage. All parcels have stipulations requiring an inventory / protection of sensitive vegetative resources (CSU12-11). See Appendix A for special status plant stipulations by parcel. The parcels in this lease sale are generally grassland and shrubland habitats that return to their pre-project composition and structure relatively easily and quickly. To obtain desirable rehabilitation of vegetation resources, adequate data on plant composition and cover inventory would be completed prior to any site disturbance. Parcel lessees would be required to spray weeds prior to, during, and after development and keep vehicle undercarriages clean prior to driving onto parcels to help mitigate impacts to vegetation from weed expansion.

3.10 Wildlife

Affected Environment

Wildlife management is factored into project planning at multiple scales and should begin early in the planning process. Evaluating wildlife values at the landscape scale is the first step to understanding potential impacts of a project. Ranges for various species, including big game species, have been mapped at the landscape level for Montana by Montana Fish, Wildlife, and Parks (FWP). Records of species occurrences are kept by the Montana Natural Heritage

Program (NHP). The proposed lease parcels were reviewed using these data as an overlay to potential wildlife values. This course-scale landscape analysis of wildlife resources provides one tool for understanding the context of the wildlife values at a large scale. Fine-scaled tools, data, and resource information based on inventory and monitoring data, as well as local knowledge from BLM and MFWP employees, are used to further examine resource issues for the specific resources contained in the lease parcels considered in this EA.

Important wildlife habitats include wetlands and riparian areas, coniferous forests, shrublands, grasslands, snags (standing dead trees), cliffs and rocky outcrops, and caves and abandoned mines. Seasonally important habitats include big game winter ranges, calving and fawning areas, raptor nest sites, bat breeding and hibernation sites, waterfowl nesting areas, greater sage-grouse and sharptail grouse courtship (leks) and nesting areas, wolf denning and rendezvous sites, and grizzly bear habitat. The proposed lease parcels occur in wildlife linkage areas for big game as defined by American Wildlands (USGS, 2008).

Populations and distribution of fish and wildlife in the area have been influenced by past management activities that have altered habitat or caused disturbance, including agricultural activities (including livestock grazing), mining, timber management, exclusion of fire (colonization by conifers into grasslands and shrublands), recreation, urban and suburban expansion, and road construction.

Generally, wildlife in the analysis area is typical of southwestern Montana. Basic life history and habitat requirement information on all species mentioned in this document can be found in the Montana Field Guide (http://fieldguide.mt.gov/, accessed September 19, 2017), and numerous other sources.

Threatened and Endangered Species

Two animal species listed under the Endangered Species Act (ESA) are listed as potentially occurring in Park County by the FWS: the Canada lynx, listed as threatened, and the wolverine, proposed to be listed. Canada lynx designated Critical Habitat also is present in Park County. Habitat, higher elevation sub-alpine fir, for both lynx and wolverine is lacking in all the parcels. However, dispersing or transient individuals could potentially pass through or near any of them in search of more suitable habitat. Designated Critical Habitat for lynx occurs a little over 1 ½ miles south and east from portions of the MTM 108592-FT parcels.

BLM Sensitive Species

Species designated as Sensitive by Montana BLM with potential to reside in or near the lease parcel areas are listed below.

- **Mammals:** black-tailed prairie dog, gray wolf, grizzly bear (recently removed as Threatened under ESA in the Greater Yellowstone Area), fringed myotis (summer only resident), spotted bat (summer only resident), Townsend's big-eared bat.
- **Birds** (migrants only not listed): bald eagle, black tern, Brewer's sparrow, burrowing owl, ferruginous hawk, golden eagle, greater sage-grouse, Lewis's woodpecker,

loggerhead shrike, long-billed curlew, McCown's longspur, mountain plover, peregrine falcon, sagebrush sparrow, sage thrasher, Sprague's pipit, veery.

- **Reptiles:** none.
- **Amphibians:** northern leopard frog, western toad.
- **Fish:** Yellowstone cutthroat trout.

Big Game

Moose range, as mapped by FWP, does not include any of the parcels but is adjacent to some, including moose winter range adjacent to MTM 108952-G6. All parcels are adjacent to or within approximately five miles of mapped moose range.

All parcels are within mule deer and/or elk general distribution/summer range, and all except MTM 108952-FU are within elk and/or mule deer winter range.

Bighorn sheep and mountain goat range does not occur within or near any of the parcels.

All parcels except MTM 108952-G6 and MTM 108952-FR are within pronghorn antelope range.

Black bear, cougar, and wolf could occur on any of the parcels.

Migratory Birds

Migratory birds can be classified as canopy nesters, shrub nesters, and cavity nesters. The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC. 703-711) states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg or product, manufactured or not. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001), addresses the need to "minimize . . . adverse impacts." This order also requires that each agency shall "restore and enhance habitat for migratory birds."

Specific surveys for migratory birds have not been done in the lease parcels. The MT National Heritage Program maintains a database of known species observations. Based on habitats found in the parcels and results of Breeding Bird Survey (BBS) routes in the surrounding area (Sauer et al. 2017), examples of birds that could be expected to commonly occur include: vesper sparrow, killdeer, meadowlark, mourning dove, eastern kingbird, horned lark, black-billed magpie. Examples of birds that would be expected to occur although more rarely on the landscape would be: willow flycatcher, veery, loggerhead shrike, prairie falcon, gray catbird.

Fisheries

Fisheries resources in the analysis area are primarily limited to a few areas with small tributary streams to the Shields and Yellowstone rivers in Park County. These tributary streams are habitat for a limited number of fish species, likely including but not limited to Yellowstone Cutthroat

trout (YCT), rainbow trout, brown trout, brook trout, mountain whitefish, sculpin and minnows. YCT, a BLM sensitive species, are present in Dry Creek, which runs through parcel MTM 108952-FT. The Yellowstone River's fish assemblage is extensive, with all of the mentioned trout species, whitefish, suckers, catfish, dace, chubs and other minnows. Furthermore, the Yellowstone River is designated a Class 1 fishery, or Blue Ribbon Fishery, in the reach near Livingston. There are other small intermittent streams associated with lease parcels that may or may not contain fish populations; these populations would be prairie fish assemblages typical of the northern great plains, including mostly minnows such as chubs, dace and suckers.

The primary threat to these fish populations from oil and gas development at the APD stage are habitat degradation in the form of reduced water quality, water temperature increase and turbidity that results from riparian alteration and overland drainage. Localized climatic events, such as drought, can also impact fish populations in intermittent and small perennial streams in the analysis area. The Butte Field Office Resource Management Plan includes a number of stipulations that apply to federal fluid mineral leasing that protect watershed health, increasing functionality of fish habitat on streams and rivers. Many of the stipulations listed above for wildlife habitat, special status wildlife and riparian and wetland areas protect and conserve water quality in streams and rivers. In addition, a stipulation to protect important fisheries habitat was developed.

- Stipulation NSO 11-20 prohibits surface occupancy and use for oil and gas exploration and development within ½ mile from the centerline of streams containing Class 1 fisheries (Blue Ribbon Fisheries).

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on wildlife because no surface disturbance would occur. Any potential effects on wildlife from the sale of lease parcels may occur at the time the leases are developed at the APD stage. However, if exploration and/or development occurs, potential negative effects of oil and gas development on wildlife can be divided into six general categories:

1) direct loss of habitat;
2) physiological stress to wildlife;
3) disturbance and displacement of wildlife;
4) habitat fragmentation and isolation;
5) introduction of competitive and predatory organisms; and
6) secondary effects created by work force assimilation and growth of service industries.

Collectively, the amount of disturbance may encompass a small portion of the land. However, avoidance and stress responses by wildlife extend the influence of each well pad, road, and facility to surrounding habitats.

There would be no effects to wolverine, Canada lynx, or Canada lynx Critical Habitat from offering the parcels for lease. There would be no impact to sensitive fish and wildlife species from offering the parcels for lease.

Wildlife stipulations have been prepared for leasing the parcels (USDI-BLM 2009). Species and habitats with stipulations specifically for them which are necessary in this EA due to likelihood of their presence include:

- Sage-grouse winter & spring range (TL 13-14); Sage-grouse brood rearing habitat (TL 13-30)
- Bald eagle nest sites (NSO 11-44, TL 14-26), golden eagle, Swainson's hawk, peregrine falcon nest sites (NSO 11-7), peregrine falcon, ferruginous hawk nest sites (NSO 11-54)
- Raptor Nest Sites (TL 13-11),
- Yellowstone cutthroat trout (NSO 11-48),
- Big game winter range (TL 13-28),
- Blue Ribbon or Class 1 fishery streams (NSO 11-20).

Areas covered by stipulations for these species or other, non-wildlife stipulations such as NSO in riparian areas, would encompass habitat used by other special status and non-status species, and benefit those species as well.

Upon receipt of an Application for a Permit to Drill (APD), the BLM would initiate a site-specific NEPA analysis that considers the direct, indirect, and cumulative effects of a specific action. Field surveys for wildlife and habitats would need to be included as a part of this analysis. Such an analysis and surveys could lead to additional stipulations, mitigation measures, or changes to proposed actions to protect wildlife.

3.11 Cultural Resources

Affected Environment

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources which are located on public lands, or that may be affected by BLM undertakings on non-Federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The procedures for compliance with the NHPA are outlined in regulation under 36 CFR 800. Cultural resources include archaeological, historic, and architectural properties, as well as traditional life-way values and/or traditional cultural properties important to Native American groups.

It is anticipated that some lease parcels may contain prehistoric Native American sites; traditional cultural properties (TCP); historic ranching, homesteading and perhaps some mining sites that have not yet been documented. A files search performed at the Butte Field Office on September 12, 2017, using the site and inventory atlas as well as the database kept by the State Historic Preservation Office, revealed two lithic scatters on one of the parcels near Livingston. While the "reasonable foreseeable development" scenario for this lease package is very low

(approximately 80 acres), parcels in the Paradise Valley, along Sheep Mountain and Battle Ridge are considered "high potential" for significant cultural resources. Tribal governments have shown an interest in the Paradise Valley on several occasions.

Cultural Resource Notice CR 16-1 and Lease Notice 14-2 were applied to all lease offerings. The Notices read:

> *CR 16-1: This lease may be found to contain historic properties or resources protected under National Historic Preservation Act (NHPA), the American Indian Religious Freedom Act (42 U.S.C. 1996), Native American Graves Protection and Repatriation Act (25U.S.C. 3001 et seq.), Executive Order 13007 (May 24, 1996), or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., state historic preservation officer and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.*
>
> *LN 14-2: The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures.*
>
> *This notice would be consistent with the present Montana State Office guidance for cultural resource protection related to oil and gas operations (NTL-MSO-85-1).*

The Lewis and Clark National Historic Trial (L&CNHT) marks the path of the Corps of Discovery, or the Lewis and Clark Expedition, on their expedition to the Pacific Ocean. The return trip of William Clark with twelve other members of the Corps of Discovery is that part of the trail crossing lands managed by the Butte Field Office of the BLM. The trail through Park County is in and along the Yellowstone River. The centerline of the L&CNHT is considered the river, with a ½ mile buffer applied by stipulation NSO 11-26. Maps of National Historic Trail buffers and lease parcels are in the administrative record.

Environmental Consequences

Offering the parcels for lease would have no direct, indirect, or cumulative impacts on cultural resources because no ground disturbance would occur. Any potential effects from the sale of leases would occur at the Application for a Permit to Drill (APD) stage when the parcels are developed. Potential site-specific effects would be addressed in detail in a subsequent NEPA analysis when an APD is submitted. The direct, indirect, and cumulative impacts from fluid mineral development on cultural resources are discussed in Chapter 4 of the Butte Final EIS (USDI–BLM, 2008) and are incorporated by reference into this EA.

Leased parcels are subject to CR 16-1 (NHPA compliance) and LN 14-2 Cultural Inventory Requirement, which allows for identification and avoidance of sites through project re-design. Cultural resources identified through this stipulation would be avoided or evaluated for the NRHP. Any eligible site, or site for which a clear eligibility determination cannot be obtained, which cannot be avoided may become subject to Stipulation NSO 11-120 (No Surface Occupancy). The L&CNHT is protected through the application of NSO 11-26 (No Surface Occupancy).

3.12 Native American Religious Concerns

Affected Environment

The National Register of Historic Places defines a "traditional cultural property" as "… one that is eligible for inclusion the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." (National Register Bulletin #38; Guidelines for Evaluating and Documenting Traditional Cultural Properties; pg 2) The file search conducted for cultural resources produced results that could be considered "high potential" for the presence of culturally significant sites. The Paradise Valley, the Sheep Mountain and Battle Ridge place names may indicate locations which could be culturally significant. There are no known sites of religious or cultural importance to the tribes in these nine parcels. Please refer to Section 3.7 for a summary of the results of the cultural resources file search.

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on Native American cultural sites because no surface disturbance would occur. Any potential effects to these sites from the sale of lease parcels may occur at the time the leases are developed at the APD stage. As noted above, CR 16-1 provides notice that Native American cultural resources may be present and requires compliance with applicable requirements of the NHPA and other authorities. NSO 11-23 provides that no surface occupancy or use is allowed within one-half mile of the boundaries of cultural properties determined to be of particular importance to Native American groups, determined to be traditional cultural properties, and/or designated for traditional use.

Effects to Native American Concerns from subsequent development of the lease parcels are unlikely because of stipulations in place via this EA.

3.13 Paleontology

Affected Environment

The Potential Fossil Yield Classification (PFYC) is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. It was developed by the BLM based on geologic units. The classification should be considered at an intermediate point in the

site specific analysis, and should be used to assist in determining the need for further mitigation assessment or actions. Under the PFYC, a higher class number indicates a higher potential for fossils.

The largest number of fossil localities in areas covered by the Butte Field Office have been recorded in Jefferson County, which is outside the scope of this EA. A limited number of invertebrate fossil localities have been reported in Madison formation exposures in Gallatin County. The Madison formation itself is a productive fossil-bearing unit for invertebrate fossils from the Paleozoic era. The PYFC for these areas would be 3. In rare cases, glacial outwash deposits, which are present over large areas of Lewis and Clark County and Broadwater County, have been known to contain Paleogene (Tertiary) and Quaternary period fossils. Because their occurrence is unpredictable, the PYFC rating for these deposits is unknown

Park County includes extensive areas of Cretaceous sedimentary rocks and minor occurrences of Jurassic sedimentary rocks. Some of these units have fossil occurrences as noted in the table below (MBMG, 2007). As most of these parcels are private surface, the Field Office has little information on any potential fossil occurrences. If a site specific proposal is received the parcel will be evaluated in detail at that time.

The two BLM parcels, MTM 108952-FT and MTM 108952-FU consist almost exclusively of Quaternary pediment gravel, colluvium and alluvium, and are rated as PFYC of unknown. One of the parcels is reported to have contained a dinosaur fossil reworked from older rocks.

The BLM classified geologic formations that have a PFYC of 3 or higher, or are ranked as unknown, should be specifically reviewed by a professional BLM-permitted consultant prior to ground disturbing actions. The parcels involved in this evaluation have one or more of the geologic units listed in Table 11.

Please refer to Volume 1, page 270, of the Butte Field Office RMP for a more detailed discussion of fossils and fossil-bearing formations in the management unit.

Table 11: Geologic units and PFYC rank within the lease parcels.

Rock Unit	**PFYC rank**	**Typical Paleontological Resources**
Pediment Gravel Colluvium	Unknown	Older deposits can preserve animals like *Bison*, mammoth, and other Ice Age fauna. One of the lease parcels contained a dinosaur fossil reworked from older rocks.
Fort Union	4	Common plant, wood, invertebrates, and important vertebrate faunas in some areas.
Billman Creek	3	Plants, dinosaurs, and mollusks
Sedan	3	Wood and plants, mollusks, dinosaur bone
Eagle, Telegraph Creek, and Belle Fouche, undivided	5	Ammonites, baculites, cephalopods, rare crabs, also leaves, fish, shark teeth, dinosaurs, marine reptiles, and birds, dinosaurs all potential
Mowry-Fall River	3	Ammonites, marine fossils
Kootenai	5	Mollusks, dinosaurs, mammals
Morrison and Ellis	5	Diverse selection of a wide range of Mesozoic flora and fauna

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on paleontological resources because no surface disturbance would occur. Any potential effects on paleontological resources from the sale of lease parcels may occur at the time the leases are developed at the APD stage. Effects to paleontological resources located within the lease parcels are unlikely because of stipulations in place via this EA. Leased parcels are subject to CSU 12-8, LN 14-3, 14-5 and 14-12, Paleontological Inventory Requirement. Paleontological resources identified through stipulations would then would become subject to mitigation.

3.14 Lands and Realty

Affected Environment

The lands proposed for competitive leasing of the federal mineral estate are a mix of BLM administered federal lands and private lands overlying either federal minerals or federal oil and gas. There are 2 parcels totaling 670 acres with full fee estate (BLM surface and federal mineral estate) under the jurisdiction of BLM. There are a total of 7 split estate parcels totaling 3,637 acres. For split estate parcels, the United States owns the fluid minerals for those parcels as well as any surface entry rights. Parcel MTM-108952-FT is traversed in the Northwest corner by Rights-of-Way for Interstate 90 (MTM-0-35702) and a Northwestern Energy power line (MTM-63063). Any oil and gas lease is subject to these pre-existing rights.

Unless access to a BLM parcel is available using existing legal access, it is the responsibility of the lease holder/operator to determine appropriate access routes and make arrangements with the respective surface owners. Any access to private parcels will require arrangements with the respective surface owners. The issuance of a federal oil and gas lease does not guarantee access across adjacent private lands to access the federal oil and gas lease. It is the responsibility of the lease holder/operator to determine if legal access can be arranged through private lands.

Environmental Consequences

Offering nine parcels for lease would have no direct impacts on lands and realty because no surface disturbance would occur. Any potential effects on lands and realty from the sale of lease parcels may occur at the time the leases are developed at the APD stage. Measures would need to be taken to avoid disturbance to, or impacting existing rights-of-way on federally administered surface in the event that the leased parcels are developed. Potential lease buyers are notified of existing ROW's and potential conflicts with development through the application of LN 14-1 (see Appendix A). Any new or "off-lease rights-of-way required across federal surface for future exploration and/or development of the parcel would be subject to a separate review and be subject to stipulations to protect other resources as determined by environmental analysis which would be completed on a case-by-case basis.

3.15 Social and Economic Conditions

Affected Environment

Social and Environmental Justice

This section focuses on Park County, which contains the parcels proposed for leasing. The social and economic environment of these counties is described in detail in the BFO ARMP/FEIS (3-311 through 3-322; BLM, 2009) so there is only a brief description provided here. U.S. Census Bureau estimates for 2015 that Park County had a population of 15,972 (U.S. Census Bureau, 2016a).

Executive Order 12898 (Feb. 11, 1994), Federal Actions to Address Environmental Justice in Minority and Low-Income Populations states "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" Analysis requires the identification of minority populations and low-income populations that may be affected by any of the alternatives.

The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. It is important to note that minority populations, low-income populations, or Tribes may experience common effects from a project even if they do not reside in the immediate study area. EO 12898 requires Federal agencies to ensure opportunities for effective public participation by potentially affected low-income populations, minority populations, or Indian tribes. These populations are considered to be potential "environmental justice populations" of concern that should be addressed throughout the planning effort.

Minority populations as defined by Council on Environmental Quality (CEQ) guidance under the National Environmental Policy Act (CEQ 1997) include individuals in the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified where "(a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater" (CEQ 1997). Additionally, "[a] minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997).

Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed every year. Poverty thresholds are set by the U.S. Census Bureau. CEQ guidance does not provide specific criteria for determining low-income populations as it does for minority populations, so for this project we will use the same criteria as is being used for minority populations (50 percent or greater of the population or a population that is "meaningfully greater"). We identify low-income population and minority population

percentages that are “meaningfully greater” as at least five percentage points higher than for the State of Montana.

Minority populations are identified using the U.S. Census Population Estimates program which provides estimates for the resident population by age, sex, race, and Hispanic origin at the national, state and county scales. Total minority population refers to that part of the total population which is not classified as *Non-Hispanic White Only* by the U.S. Census Bureau. By using this definition of minority population, the percentage is inclusive of Hispanics and multiple race categories and any other minority single race categories. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

Data for the identification of low-income populations is from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE). The SAIPE program annually produces single year poverty estimates for states, counties, and school districts. The U.S. Census Bureau suggests using SAIPE data for poverty estimates for counties or school districts, especially for areas with populations of 65,000 or less (U.S. Census Bureau, 2016b). Estimates from SAIPE and the Population Estimates program are used in federal funding allocations.

Table 12: Percentage of Residents Belonging to Environmental Justice Populations, 2015/2016 Estimates

Geography	Total Population [1]	Race Alone[1]					% Two or More Races[1]	% Hispanic[1]	% total minority [2]	Poverty Percent, All Ages[3]
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				
Montana	1,032,949	89.2%	0.6%	6.6%	0.8%	0.1%	2.7%	3.6%	13.5%	14.4%
5% points greater	--	--	5.6%	11.6%	5.8%	5.1%	7.7%	8.6%	18.5%	19.4%
Park County, Montana	15,972	96.0%	0.4%	1.2%	0.4%	0.1%	2.0%	3.0%	6.5%	12.7%

[1]U.S. Census Bureau, 2016a. Table PEPSR6H: Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties: April 1, 2010 to July 1, 2015. Release date June 2016. U.S. Census Bureau, Population Division. Accessed December 29, 2016 from: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

[2]The term "total minority population" refers to the part of the total population which is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

[3]U.S. Census Bureau, 2016b. 2015 Poverty and Median Household Income Estimates - Counties, States, and National. Release date December 2016. Accessed 12-29-2016 from http://www.census.gov/did/www/saipe/data/statecounty/data/2015.html

Based upon this data, Park County did not met the criteria for an environmental justice population (see Table 12).

Economics

Parcels nominated for leasing in March 2018 covered in this EA are located in Park County. Economic conditions and trends for the region are discussed in more detail in the BFO ARMP/FEIS (BLM, 2009) so this discussion is focused on economic aspects related to oil and gas lease sales.

Mineral rights can be owned by private individuals, corporations, Indian tribes, or by local, State, or Federal Governments. Typically companies specializing in the development and extraction of oil and gas lease the mineral rights for a particular parcel from the owner of the mineral rights. Federal oil and gas leases are generally issued for 10 years unless drilling activities result in one or more producing wells. Once production has begun on a Federal lease, the lease is considered to be held by production and the lessee is required to make royalty payments to the Federal Government.

The BFO ARMP/FEIS (4-452 provides information on existing oil and gas leasing for Park County. The leasing and development of these minerals supports local employment and income and generates public revenue for surrounding communities. The economic contributions of Federal fluid minerals are largely influenced by the number of acres leased and estimated levels of production and can be measured in terms of the jobs, income, and public revenue it generates. Additional details on the economic contribution of Federal fluid minerals are discussed in the BFO ARMP/FEIS (3-311 through 3-322; BLM, 2009).

Leasing mineral rights for the development of Federal minerals generates public revenue through the bonus bids paid at competitive lease auctions and annual rents collected on leased parcels not held by production. Nominated parcels approved for oil and gas leasing are offered by the BLM at a minimum bid rate of $2.00 per acre at the competitive lease sale. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to $1.50 an acre for the first five years and $2.00 an acre for the second five years of the lease. Additionally, Federal oil and gas production in Montana is subject to production taxes or royalties. The Federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1).

A portion of the revenues collected by the Federal government is distributed to the state and counties in which the oil and gas was produced. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal revenue associated with from oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas development on public lands acquired under the Bankhead-Jones Act are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas development on other federal acquired lands differs based upon the

authority associated with those lands. Generally the revenue associated with oil and gas leasing and development that is received by the state and counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other county functions that may be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

Environmental Consequences

Social and Environmental Justice

The direct, indirect, and cumulative impacts from oil and gas development on social conditions and environmental justice populations are discussed in BFO ARMP/FEIS (3-311 through 3-322; BLM, 2009) and are incorporated by reference into this EA. The analysis indicates that the pace and scale of oil and gas development can often concern local communities. Rapid development can drive important social changes due to the influx of people to these areas who find employment in the oil and gas industry and ancillary service industries. Rapid population growth for unprepared communities can cause stress on community resources such as educational infrastructure, roads and utilities, emergency services, and community cohesion. Should oil and gas leasing and subsequent development occur, impacts to people living near or using the area in the vicinity of the lease would potentially occur. Oil and gas exploration, drilling, or production, would potentially inconvenience these people through increased traffic and traffic delays, noise, and visual impacts. These impacts would be particularly noticeable in rural areas in which oil and gas development has not occurred previously. The level of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, the length of time and season in which these activities occurred, and other factors. Creation of new access roads would potentially allow increased public access and exposure of private property to vandalism. For leases in which the surface is privately owned and the mineral estate is federally owned, surface owner agreements, standard lease stipulations, and BMPs would potentially address many of the concerns of private surface owners.

Executive Order 12898 requires the analysis of disproportionately high and adverse human health effects and environmental effects on environmental justice populations. Environmental effects may include “ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment” (page 26; CEQ, 1997) As discussed in Section 3.18.1, based upon U.S. Census Bureau data for 2015 and 2016, no group in Park County met the criteria for minority environmental justice populations. The BLM has considered all input from persons or groups regardless of age, income status, race, or other social or economic characteristics. The outreach and public involvement activities taken by the MCFO for this effort, including the consultation of tribes, are described in sections 1.4 Public Scoping and Identification of Issues, 5.1 Persons, Agencies, and Organizations Consulted, and 5.2 Summary of Public Participation.

Economics

The collection of revenues would result from leasing the parcels proposed under the proposed action. Revenues generated by leasing Federal minerals are the bonus bids paid at the competitive lease auction and annual rents collected on leased parcels not held by production. These revenues are collected by the Federal government which then distributes a portion of the revenues collected to the state and counties. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal revenue associated with oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are then redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas leasing and development from public land and resources acquired under the Bankhead-Jones Act are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas leasing and development on other federal acquired lands differs based upon the authority associated with those lands.

Table 13: Estimated Federal Revenue Associated with the March 2018 Lease Sale

County	Acres	Average Annual (nominal)		One-time Revenue
		Rent-first 5 years	Rent-second 5 years	Bonus Bid
		$1.50/acre	$2.00/acre	Min. $2.00/acre
Park	4,290.0	$6,435	$8,580	$8,580

Federal leasing revenue estimates (lease rent and bonus bids) are initially based upon the number of acres being offered, however it is unknown whether all of the parcels proposed will be sold. Due to energy market volatility and the dynamics of the oil and gas industry the BLM cannot predict the exact effects of this action, as there are no guarantees that the leases will receive bids, and that any leased parcels will be developed or that developed parcels will produce any fluid minerals. Given this uncertainty, revenue estimates are calculated under the assumption that one hundred percent of the proposed parcels are sold. Federal leasing revenue estimates provided in **Table 13** are associated with the parcels offered under the proposed action and do not include existing lease rents. To estimate annual rent revenue it was assumed that rent would be collected during the full term of the leases (10 years) since it is unknown if and when the lease will be held by production, terminated, or relinquished. This calculation of rent revenue provides the maximum amount of annual rent revenue that may be collected. Bonus bids were calculated using the minimum rate of $2.00 per acre. Given the numerous uncertainties mentioned above, only potential federal revenue is calculated and discussed.

Lease parcels in Park County could generate $6,435 in annual rent for the first five years and $8,580 for the second five years and a one-time bonus bid revenue of $8,580, assuming one hundred percent of the proposed parcels are sold (**Table 13**).

The direct, indirect, and cumulative impacts from potential oil and gas development are discussed in the BFO ARMP/FEIS (pages 1153-1173) (BLM, 2009). Oil and gas development affect employment and labor income generated by 1) payments to counties associated with the

leasing and rent of Federal minerals, 2) royalty payments associated with production of Federal oil and gas, and 3) economic activity generated from drilling and associated activities. The magnitude of these types of economic affects is based upon the level and pace of development which is unknown at this time.

CHAPTER 4 - CONSULTATION AND COORDINATION

4.1 Introduction

The BLM posted notice of this project in the NEPA Register on the BLM's ePlanning website on August 14, 2017 (scoping) and on September 29, 2017 (Environmental Assessment): https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do.

4.2 Persons, Groups, and Agencies Consulted

The following tribes, organizations and agencies were consulted during the preparation of this document.

Government/Agencies:

- Montana Fish, Wildlife, and Parks, Butte Area Resource Office, Bozeman, MT
- Montana DNRC, Trust Land Management Headquarters, Helena, MT
- Park County Board of County Commissioners, Livingston, MT
- Bureau of Indian Affairs; US Dept. of Interior
- Bureau of Reclamation, Billings, MT
- Dept. of Homeland Security; Border Patrol Facilities & Tactical Infrastructure, Washington D.C.
- Montana Historical Society, Helena, MT
- National Park Service, Denver, CO
- US Army Corps of Engineers, Omaha, NE
- US Customs and Border Protections, Washington D.C.
- US Fish and Wildlife Service, Denver, CO

Tribes

- Blackfeet Tribal Business Council, Browning, MT 59417
- Chippewa Cree Tribe, Box Elder, Mt. 59521
- Confederated Salish and Kootenai Tribe. Pablo, MT 59855
- Crow Tribe, Crow Agency, Montana
- Fort Belknap Indian Community, Harlem,
- Ft. Peck Tribes, Poplar, MT
- Northern Cheyenne Tribe, Lame Deer, MT

5.1.1 List of Preparers

Butte ID Team

Name	Resource
Amy Waring / Tessa Wallace	NEPA co-leads
Kelly Scarbrough	Recreation
Roger Olsen, Don Despain	Range
Brandy Janzen	Soils / Hazmat
Brandy Janzen	Hydrology
Scot Franklin	Wildlife
Michael Insko	Lands
Carrie Kiely	Cultural
Lacy Decker	Vegetation / Weeds
Joan Gabelman, Dave Williams	Minerals
Kahindo Kamau	Oil and Gas RFD
Randy Schardt	GIS (parcel generation)
Brenda Geesey	GIS
Merry Prestridge	Lands
Melissa Hovey	Air
Scott Rickard, Jessica Montag	Economics

APPENDICES

A: Stipulations identified for parcels
B: Description of Stipulations
C: Parcel maps depicting surface ownership (BLM, state, private)
D: Response to Comments

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